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Report to the Fifty-first Montana Legislature

Natural Resources Appropriations Subcommittee

January, 1989

Wildlife Division

Montana Department of
Fish, Wildlife & Parks

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SUMMARY

The popularity of and participation in archery hunting in Montana has increased tremendously during the past 20 years. Archery license sales increased from 2,129 in 1968 to 22,037 in 1987. The six-week elk archery season, beginning in early September and continuing through mid-October, has created some controversy among both rifle and archery hunters during the past several years. In an attempt to address some of these concerns, the 1987 Montana Legislature approved funding for the Montana Department of Fish, Wildlife and Parks (MDFWP), Wildlife Division to evaluate the effects of archery hunting on elk during 1987 and 1988. This report to the 1989 Montana State Legislature provides the results of a study to evaluate the effects of archery hunting on elk and elk management in Montana. The study involved three major items:

- A comprehensive survey of archery license holders.
- Record movements, distribution, and fate of marked elk in selected areas before, during, and after the archery season.
- Survey other western states and provinces to gather information on elk archery seasons, participation rates, harvest success and trends, existing public and management concerns, and special measures used to address elk archery issues.

Archery Hunter Survey

The following is a synopsis of this survey. Although some very sensitive questions were asked, it appears the respondents were very honest and objective in their responses.

- Response Rates - Of 15,975 questionnaires mailed to resident archery hunters, 8,569 (54%) were returned to the MDFWP. Nonresident archers were not included in the survey.
- Hunter Satisfaction - Most respondents (79%) were satisfied with current archery hunting opportunity.
- Reasons for Archery Hunting - The top three choices were, "It is a challenging way to hunt....", "less hunter congestion", and "it expands my hunting opportunity".
- Type of Equipment Used - Eighty-sex percent of the respondents said they used a compound bow. Ninety-two percent said they were also rifle hunters.
- Improvements in Archery Hunting - When asked which one of a list of several possible improvements they would like to see done first, "no improvement necessary" was chosen most frequently. Second and third choices were: "increase big game populations" and "require all bow hunters to pass a bow hunter's education course".
- Management Actions - A clear majority of the respondents were opposed to any further restrictions, although more than half favored adding $2 to the cost of the archery license to be dedicated for the purchase and/or improvement of wildlife habitat and require all hunters to purchase big game licenses (stamps) and tags before opening day of hunting.
- Vehicle Conflicts - Most respondents (54-69%) thought there was not a problem with vehicles.
- Responsiveness of Department - Most respondents thought the department was responsive to their concerns.
- Archery Hunting Expenditures - Resident archery license holders said they spent an average of $117 for transportation, $75 for food, and $120 for equipment in 1987.
- Elk Hunting Satisfaction - Seventy-five percent of the respondents said they were satisfied with archery elk hunting in Montana.

- Years Hunted and Elk Harvested - Respondents hunted with a bow an average of six years. Elk hunting success increased from 4% for first year elk hunters to about 10% for archers who had hunted 10 years.
- Paid Services - Resident archery elk hunters said they pay very little for outfitters and other services relating to their hunting. The largest category was "Access to Private Land", for which 2.9% of the archers paid some amount.
- Bull Elk Concerns - Forty-eight percent of the respondents were satisfied with the number of branch-antlered bulls in their favorite hunting area whereas 40% were not. About 36% of the respondents thought bugling by bull elk was staying the same or decreasing.
- Shots Taken at Elk - About 64% of the respondents said they took no shots at elk in 1987, while only 10% said they took 3 or more shots. An estimated 850 elk (49%) of the 1,735 elk reported hit during the 1987 archery season were killed and retrieved. The fate of the remaining 885 (51%) hit but not retrieved is unknown.
- Elk Disturbance - Two-thirds of the respondents believed that archery hunting did not significantly affect elk distribution.

Effects of Archery Hunting on Elk

- The Elkhorn Mountains - Based on the fate of 212 radio marked elk, the effects of archery hunting on the elk population in this area was not great. During the 1982 through 1987 period, archery hunting accounted for only 6.0% (3.4% legal and 2.6% wounding) of total annual elk mortality. In comparison, rifle hunting accounted for an average of 70.1% (66.7% legal and 3.4% wounding) of total annual elk mortality.

- The Little Belt Mountains - Since 1983, 143 elk have been captured, marked, and released from the Judith River Elk Herd. Fifty-seven (79%) of 72 marked bulls and 14 (20%) of 71 marked females were killed by gun hunters from 1983-1988. No marked elk were reported killed by archers.

  Ten elk (6 bulls and 4 cows) with radio collars were tracked weekly from about mid-August to mid-October, 1987-1988. These elk were also tracked about every 3 weeks from June 1 to mid-August during these years. Comparisons of summer relocations vs. early fall relocations showed no consistent separation between these two categories of relocation data that would indicate archers caused a major shift in how elk used the area.

- The Gravelly Mountains - Low observed calf:cow ratios in this area during the winters of 1979-1980 and 1980-1981 coincided with low antlered-bull/cow ratios. Concern over these ratios resulted in changes in hunting regulations in hunting district (HD) 324 during 1981. The early archery season was eliminated, and the kill during the general elk season was limited to branch-antlered bulls. The branch-antlered bull regulation was implemented in several adjacent hunting districts in subsequent years. A long term study was initiated in January, 1984, to assess the role and importance of various hunting strategies and differing kinds and levels of hunting pressure on elk population characteristics and dynamics. Beginning in 1988 the archery season was re-established in HD 324.

  Ten and 13 radio-marked elk in and adjacent to this hunting district were tracked weekly from late August to mid-October in 1986-1988 and 1987-1988, respectively. Comparisons of 1986-1987 or 1987 (pre-archery) relocations to 1988 (archery) relocations showed no consistent distributional response of these elk to the re-establishment of the archery season in 1988.

Since 1984, only 4 (3.7%) of 110 documented hunter kills of 374 marked animals available to hunters have been due to archery hunting. One of these was a crippling loss. Of the 106 marked elk taken by rifle hunters, 5 were crippling losses. Thus far, the proportion of hunter kills of marked elk attributable to archers is small, and reestablishing archery hunting in HD 324 in 1988 did not seem to change this appreciably.

Resource Agencies Survey

This survey was sent to 10 state and provincial fish and game agencies in the Rocky Mountain West. The following is a synopsis of this survey.

- Compared to other states and provinces, Montana has the longest and most liberal elk archery season in North America. We currently do not have a "choose your weapon" philosophy, and we maintain a 43-day special either-sex archery season across most of the state. Our only restriction occurs in requiring nonresident archers to possess a nonresident combination license with a set legislative quota of 17,000 per year.

- Under these circumstances, Montana had the second largest number of archers hunting elk of any state or province in 1986, although our estimated archery harvest of 738 elk ranked fifth. Montana's success rate of 6% was among the lowest in 1986. For the years 1982-1986, Montana showed an increase in the number of bow hunters with a relatively stable elk harvest. The number of bow hunters in Montana during this period did not increase as much as in some other states.

- The survey highlighted several basic concerns expressed either by the public or by wildlife agencies regarding bow hunting for elk. Many of these are based on public perception or social issues rather than demonstrated biological problems. There is a clear lack of good biological data on several questions related to bow hunting for elk. Studies have been initiated, but we are in the early stages of evaluating the reproductive impact of hunting during the rut, the significance of wounding loss, and the selection pressure archery places on bull-age classes.

- Our recent efforts to obtain archery harvest information at the hunting district level and a better understanding of bow hunter attitudes and preferences should provide valuable information for charting a course for more enlightened management decisions.

I. INTRODUCTION

The popularity of and participation in archery hunting in Montana has increased tremendously during the past 20 years. Archery license sales increased from 2,129 in 1968 to 22,037 in 1987. This represents an increase of over 1,000 percent during the past 20 years.

The six-week elk archery season, beginning in early September and continuing through mid-October, has created some controversy among both rifle and archery hunters during the past several years. Many questions have been raised regarding potential impacts such as harvest of mature bulls, disturbance of elk during the rut, effects on elk distribution, and wounding rates and loss.

In an attempt to answer some of these questions, the 1987 Montana Legislature approved funding for the Montana Department of Fish, Wildlife and Parks (MDFWP), Wildlife Division to evaluate the effects of archery hunting on elk during 1987 and 1988. An ad-hoc committee was selected to recommend how best to spend this money and conduct the evaluation.

The committee recommended that the evaluation of the impacts of archery hunting on elk include the following items.

1) A comprehensive survey of archery license holders in order to:

    a) Obtain better archery hunting and harvest statistics for the first year of the study;

    b) Obtain preference and attitude information relating to current and potential archery management actions in Montana;

    c) Obtain archery hunter information relating to the question of wounding loss; and,

    d) Identify the reasons that archers prefer archery hunting.

2) Monitor movements and distribution of radio-collared elk before, during, and after the archery hunting season in selected areas to determine effects of archery hunting on elk distribution and the archery harvest of marked elk.

3) Survey other western states and provinces to provide a regional perspective on archery season structures, participation rates, harvest success and trends, existing public and management concerns, and special measures used to address elk archery issues for comparison with Montana's situation.

This report to the 1989 Montana State Legislature provides the results of the study to evaluate the effects of archery hunting on elk and elk management.

II. ARCHERY HUNTER SURVEY

In conjunction with a two-year evaluation of the effect of archery hunting on elk, a special survey was conducted to determine preferences and attitudes of archery license holders. This section of the report is a summary and discussion of that survey.

A. Survey Objectives

1) To conduct a complete survey of archery license holders to obtain better archery hunting statistics for the first year of the study.

2) To obtain preference and attitude information relating to current and potential archery management actions in Montana.

3) To obtain archery hunter information relating to the question of wounding loss.

4) To identify the reasons archers like archery hunting.

B. Methods

A comprehensive survey questionnaire was developed based upon the deer and elk preference survey. It was reviewed by department wildlife staff, wildlife managers, and the Montana Bowhunters Association. During the last two weeks of January, the questionnaires were mailed to all of the 15,975 resident archery license holders on file. As an incentive to return the questionnaire promptly, recipients were informed that if they returned their complete survey by February 15, 1988, they would be eligible to win one of five archery equipment prizes at a drawing to be held April 12, 1988. Due to problems with the bulk rate mailing, a number of sportsmen did not receive questionnaires. To remedy this problem, post cards were sent to all people who had not responded to the survey by mid-February reminding them to return the survey if they had received one, and if they had not received a survey form to contact the department to obtain one.

Data analysis was done utilizing standard database statistical routines.

C. Results

1. Response Rates

Of 15,975 questionnaires mailed, 8,569 (54%) were returned to the department. However, since nonresidents were not included and some residents were not on our computer file, the number of responses represents 39% of the 22,037 total archery license holders during the 1987 license year.

2. Hunter Satisfaction

When asked if they were generally satisfied with current archery hunting opportunity, 79% said "yes" and 16% said "no". The results of "why" people answered the way they did have been documented in another report.

3. Reasons for Archery Hunting

Respondents were given an opportunity to indicate the level of importance they placed on each item in a list of reasons why people might like to archery hunt. The top three choices (>75%), in order of magnitude were, "It is a challenging way to hunt...", "less hunter congestion", and "it expands my hunting opportunity" (Table 1).

The least important reasons were: "My friends hunt archery", "It provides an opportunity to hunt either sex", and "It's a nice time of the year to hunt".

Table 1. Importance of common reasons people archery hunt based upon responses from the Archery Survey Part II, Questions 2 and 3.

	Importance in % of Responses			
Reason	Important	Not Important	No Opinion	Top Three[1]
It's a nice time (weather) of the year to hunt	57	35	5	28
It's a challenging way to hunt	91	4	2	68
There is less hunter congestion/competition	80	13	4	55
My friends archery hunt	27	59	8	7
Expands my hunting opportunity	76	16	3	42
Allows me to hunt big game before the general season	65	27	4	24
It provides me an opportunity to hunt either sex	48	44	4	23
Other	15	1	1	12

[1] Percentage of respondents indicating this choice as one of the three most important reasons they archery hunt.

4. Type of Equipment Used

Eighty-six percent of the respondents said they use a compound bow; 1% and 10% use long bows and recurves, respectively. When asked if cross bows should be legalized during the archery season, 86% said "no". Ninety-two percent of the archers were also rifle hunters.

5. Improvements in Archery Hunting

When asked which one of a list of several possible improvements they would like to see done first, "no improvement necessary" was chosen most frequently (Fig. 1). Second and third choices were: "increase big game populations" and "require all bow hunters to pass a bow hunter's education course". The least chosen improvement was "restrict archers to non-mechanical bows only".

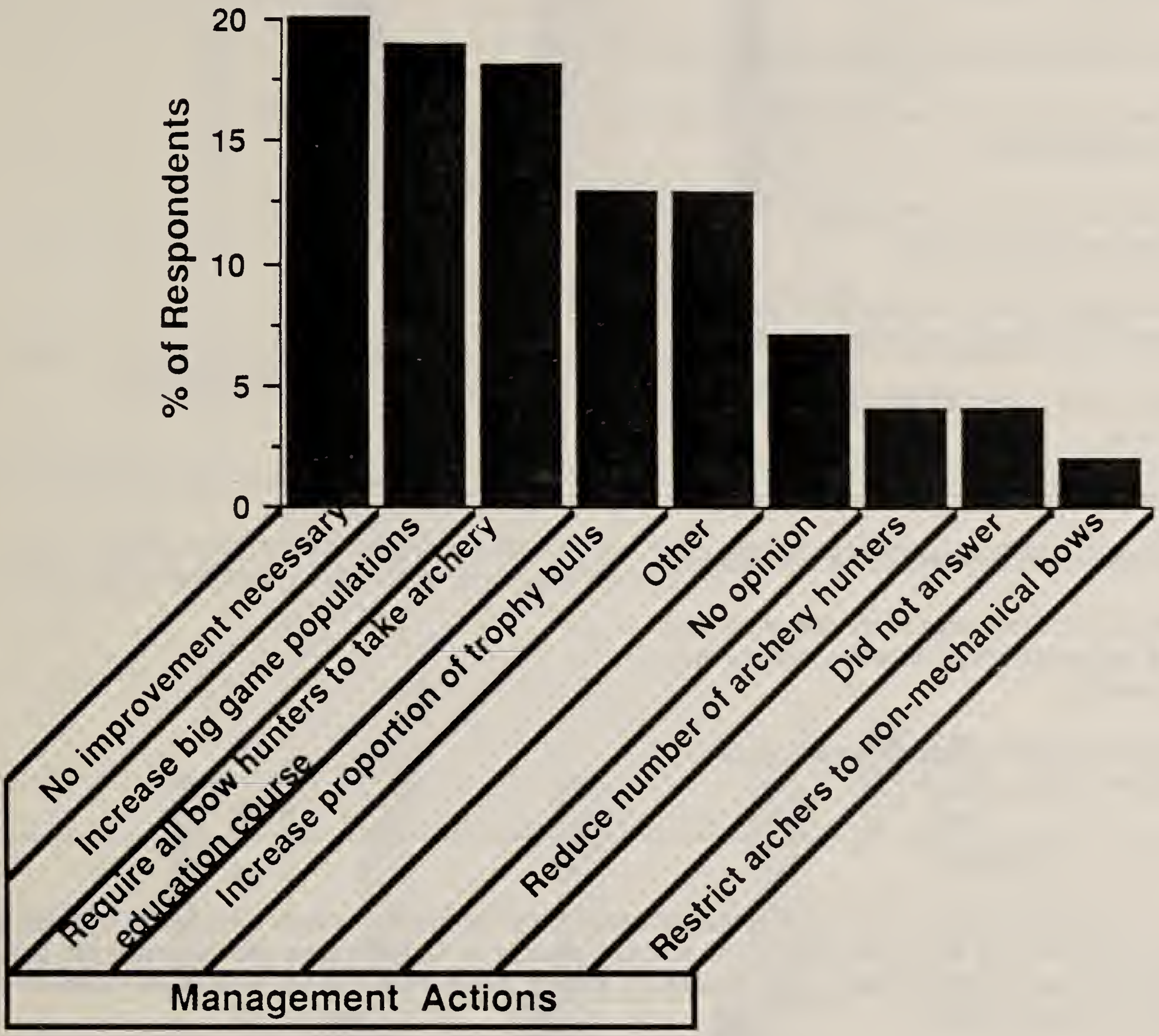

Figure 1. Respondents' choice of management action they would like to see done first to improve archery hunting.

6. Management Actions

A clear majority of the respondents were opposed to: any further restrictions on archers or archery hunting, and to a general increase in the archery license fee (Table 2).

Table 2. Responses of licensed archers to a series of proposed management actions which would alter the archery hunting season in Montana.

Management Action	% of Respondents Favor	Oppose	No Opinion	No Answer
Require hunters to choose to hunt by either rifle or archery	12	84	2	2
Archers could hunt only one species each year	3	93	2	2
Archers could hunt all species but only hunt one hunting district	8	85	5	2
Increase the Archery License $20 to help limit the number of hunters	16	76	6	2
Increase the Archery License to $8 and dedicate $2 of this for wildlife habitat	67	23	7	3
Limit Archery Licenses and issue by a drawing	3	93	2	2
Shorten the archery season by two weeks	3	91	3	3
Lengthen the archery season by two weeks	52	33	12	3
Shorten the archery season by one week and have a two week break between archery and rifle hunting	17	69	11	3
Require all hunters to purchase a license before the archery season	52	45	0	3

More than half of the respondents favored: lengthening the season two weeks by adding a late season; adding $2 to the cost of the archery license to be dedicated for the purchase and/or improvement of wildlife habitat; and require all hunters to purchase big game licenses (stamps) and tags before opening day.

7. Vehicle Conflicts

Most respondents (54-69%) thought there was not a problem with aircraft, all-terrain vehicles, and 4X4 trucks (Fig. 2). However, from 21 to 40% believed there was a problem.

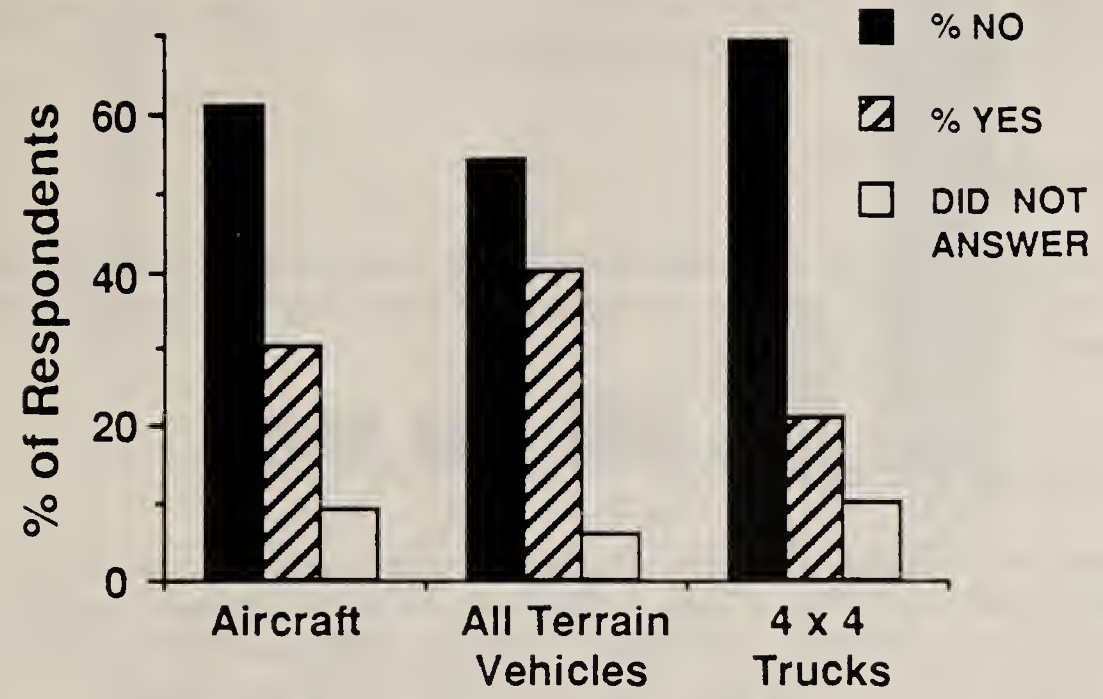

Figure 2. Archery survey respondents indication of whether or not they believed there was a problem with the use of certain vehicles during the archery season.

8. Responsiveness of Department

Most respondents thought the department was responsive to their concerns (Fig. 3). Less than a fourth believed the department was not responsive.

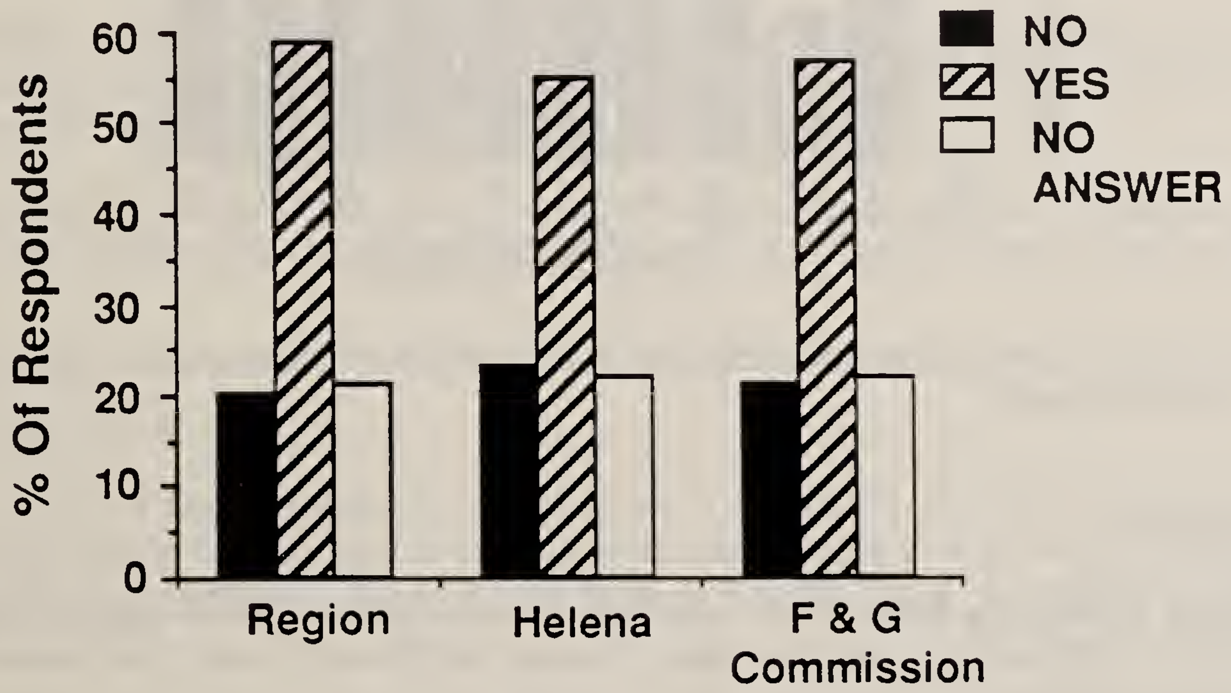

Figure 3. Archery survey respondents indication of whether or not they believed the MDFWP was responsive to their archery season concerns.

9. Archery Hunting Expenditures

Based on these results, resident archery license holders spent an average of: $117 for transportation, $75 for food, and $120 for equipment in 1987.

10. Elk Hunting Satisfaction

Seventy-one percent of the respondents said they were satisfied with archery elk hunting in Montana. The results of "why" people answered the way they did are quit extensive and are included in a separate report.

11. Years Hunted and Elk Harvested

Respondents hunted elk with a bow an average of six years. Over the last 10 years, 21% of the licensed archery hunters killed at least 1 elk. Successful elk archery hunters averaged killing 2.1 elk during the ten-year period. Elk hunting success increased from 4% for first year elk hunters to approximately 10% for archers who had hunted 10 years (Fig. 4).

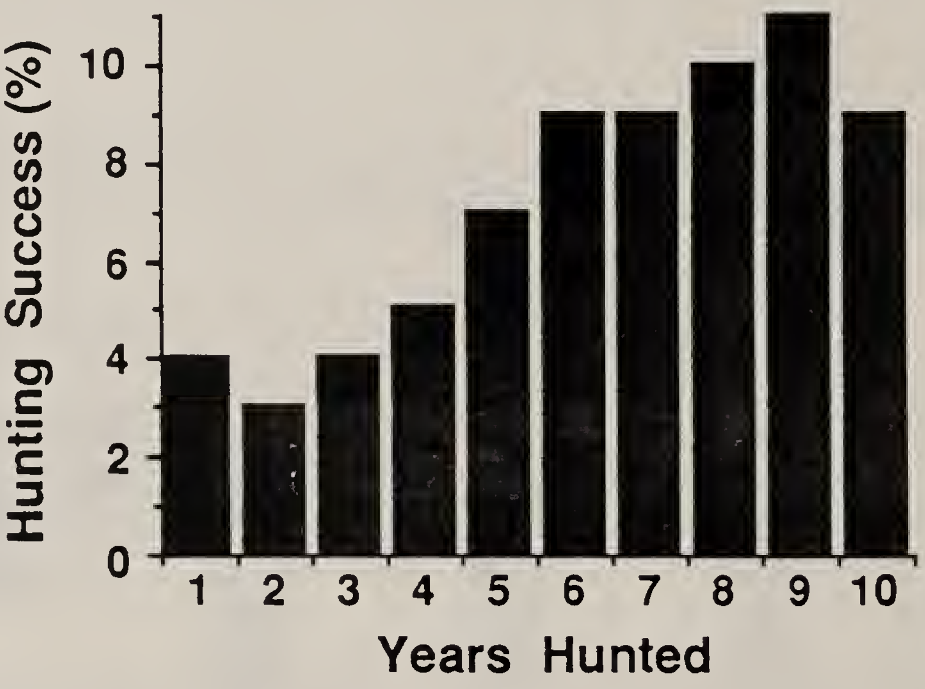

Figure 4. Annual elk hunting success compared to the number of years archers indicated they've been hunting elk.

12. Paid Services

Resident archery elk hunters pay very little for outfitters and other services relating to their hunting (Fig. 5). The largest category was "Access to Private Land", for which 2.9% of the archers paid some amount.

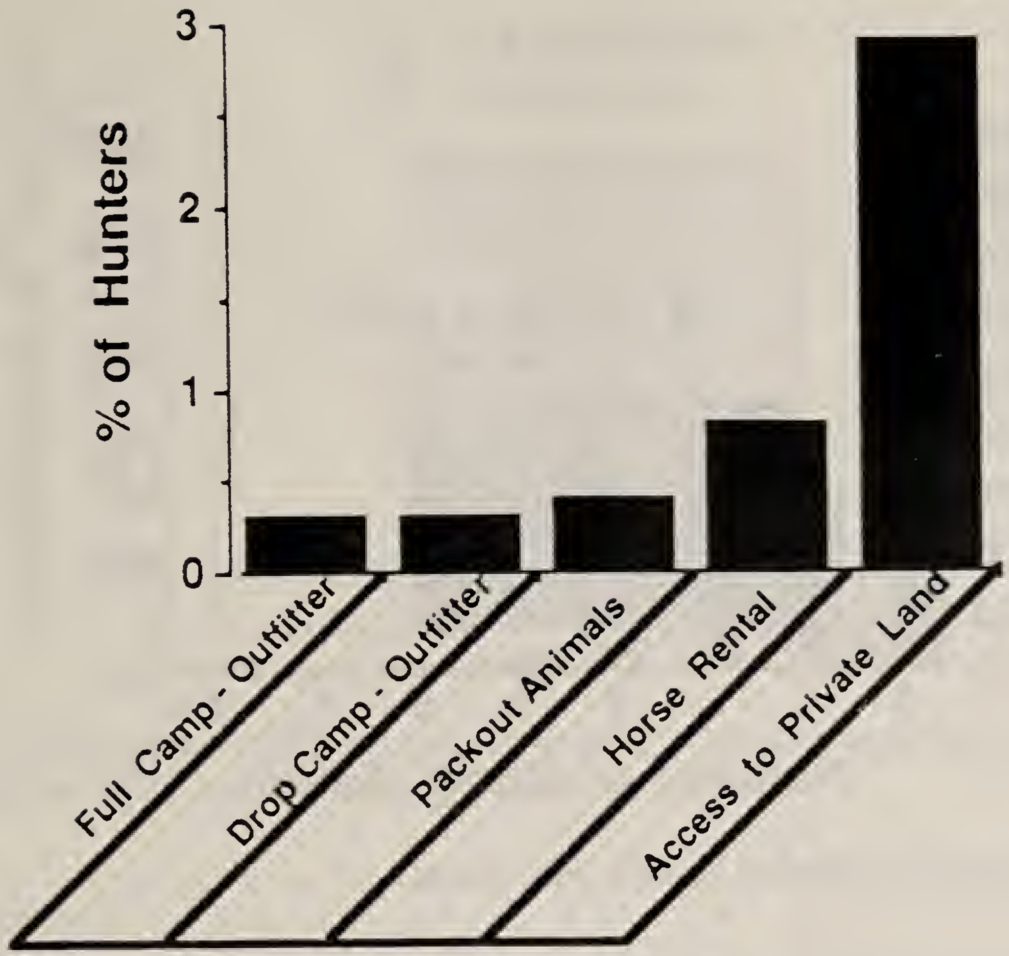

Figure 5. Percentage of elk archery hunters paying for hunting services during the 1987 archery season.

13. Bull Elk Concerns

Forty-eight percent of the respondents were satisfied with the number of branch-antlered bulls in their favorite hunting area whereas 40% were not.

Half (50%) of the respondents would not pass up a shot at a cow and wait for a bull; 40% said they would. Only 28% said they would pass up a shot at a spike and wait for a larger bull. Sixty-one percent would shoot a spike.

Approximately 11% of the archers thought bugling by bull elk had increased in the last 10 years. For both categories, about 36% of the archers thought it was staying the same or decreasing.

14. Shots Taken at Elk

About 64% of the respondents took no shots at elk during the 1987 season (Figs. 6 and 7). Nineteen percent of the hunters shot at one elk. Fourteen percent shot at two or more elk. Twenty-one percent of the hunters took one shot, 9% took two shots, while an additional 10% took 3 or more shots.

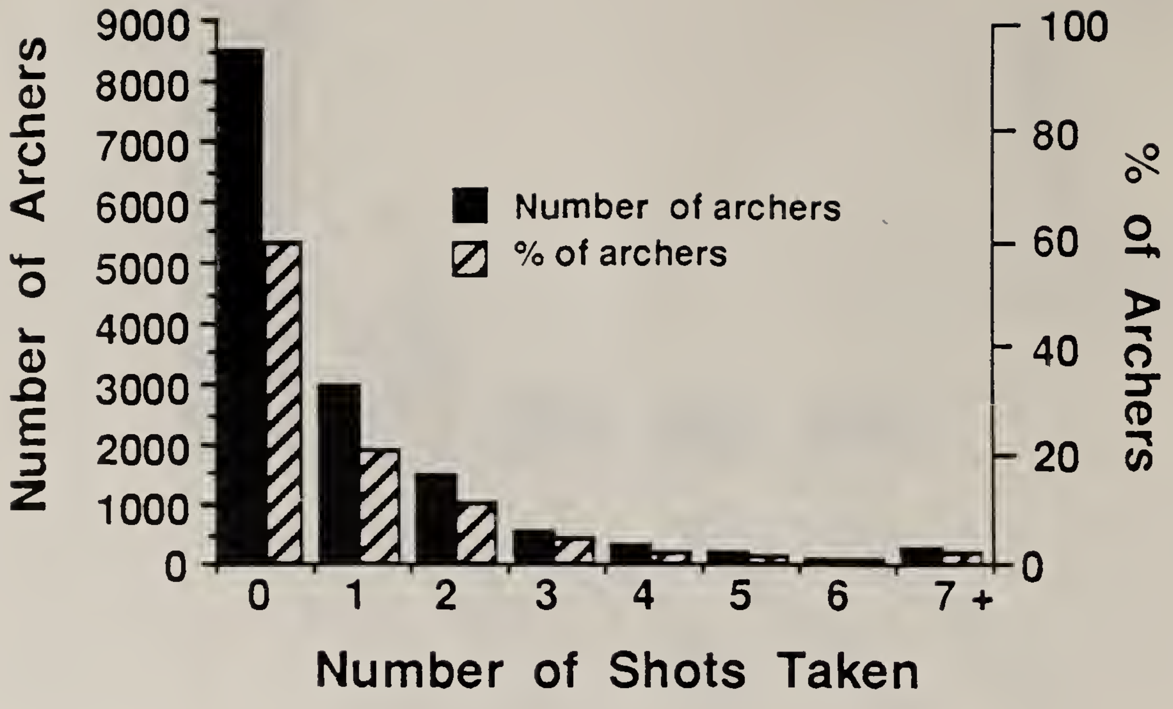

Figure 6. Number of times elk archery hunters shot at elk.

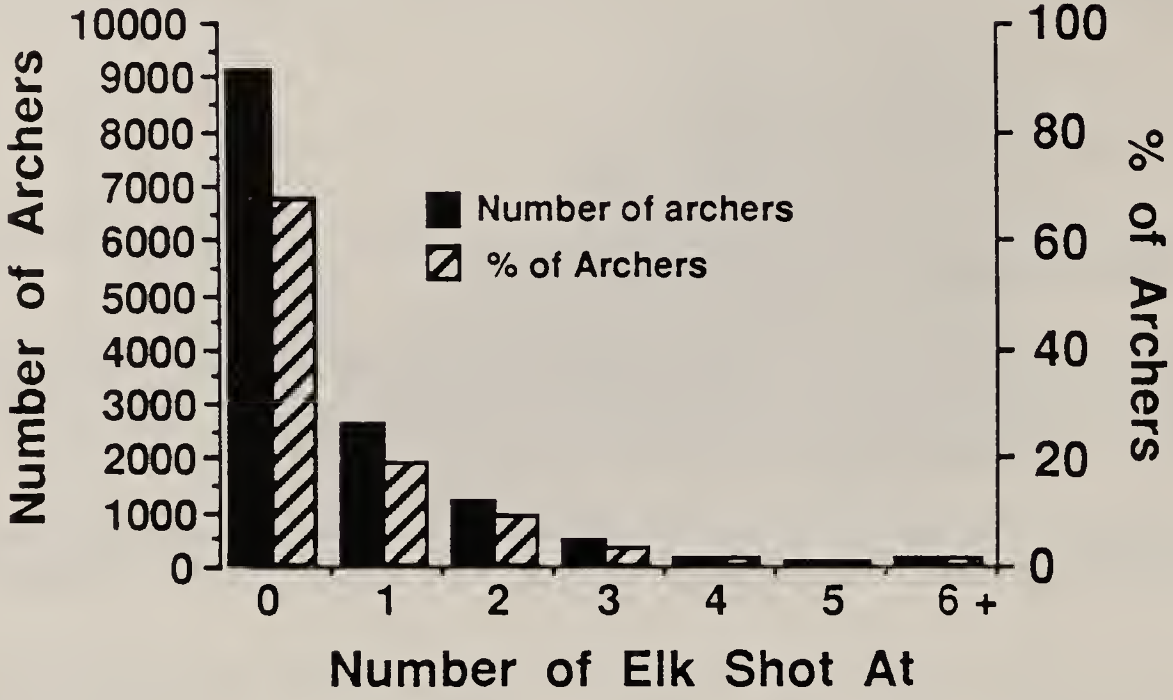

Figure 7. Number and percentage of archery elk hunters shooting at elk in the 1987 hunting season.

An estimated 850 elk (49%) of the 1,735 elk reported hit during the 1987 archery season were killed and retrieved (Fig. 8). The fate of the 885 elk hit but not retrieved is unknown.

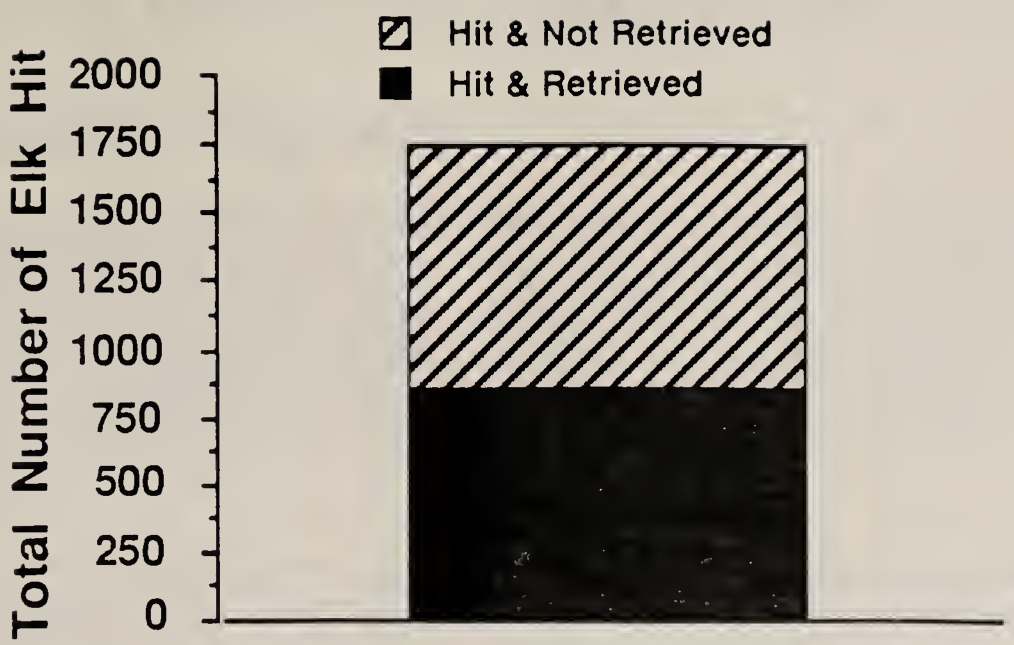

Figure 8. Estimated numbers of elk hit and retrieved vs. those hit and not retrieved by archers during the 1987 archery hunting season in Montana.

15. Elk Disturbance

Two-thirds (66%) of the respondents believed that archery hunting did not significantly affect elk distribution. Twenty-four percent thought it did.

III. EFFECTS OF ARCHERY HUNTING ON ELK

A. THE ELKHORN MOUNTAINS

During the period 1982-1987, MDFWP radio-collared 212 elk (110 bulls and 102 cows) in the Elkhorn Mountains (Hunting District 380). This effort provided an opportunity to evaluate the effects of archery hunting on this elk population. During this period, four radioed elk (two cows and two bulls) were harvested by archers and three radioed elk (one cow and two bulls) died as a result of wounding by archers. During this same period, 78 radioed elk (23 cows and 55 bulls) were harvested by rifle hunters and 4 radioed elk (2 cows and 2 bulls) died as a result of wounding by rifle hunters.

Information from this area supported statewide information indicating that archers tend to harvest branch-antlered bulls over spikes (both radioed bulls harvested were branch-antlered two year olds, as were both radioed bulls that died as a result of wounding by archers). Statewide information indicated that archers wound approximately one elk for every elk legally harvested. Information from the Elkhorns indicated that three elk died as a result of wounding and were not retrieved for every four elk taken by archers.

A higher percentage of archers wounded elk than did rifle hunters although more wounding mortality occurred during the rifle season than the archery. Approximately 300 archers and 3,000 rifle hunters hunt the Elkhorns annually. Wounding mortality during the archery season accounted for an average of 2.6% of annual elk mortality while wounding mortality during the rifle season accounted for 3.4% of annual elk mortality.

In conclusion, the effects of archery hunting on this elk population was insignificant. During 1982-1987 period archery hunting accounted for only 6% (3.4% legal and 2.6% wounding) of total annual elk mortality. In comparison, rifle hunting accounted for an average of 70% (66.7% legal and 3.4% wounding) of total annual elk mortality.

B. THE LITTLE BELT MOUNTAINS

1. Gun and Archery Season Harvest Data

Since 1983, 143 elk have been captured and released from the Judith River Elk Herd of the Little Belt Mountains (Table 3, Figs. 9 & 10). Seventy-two of the captured elk were bulls and 71 were females. Sixty-two bulls and 24 cows were fitted with radio transmitter collars: the remaining 57 animals were fitted with individually identifiable neckbands. Fifty-four of the 62 radioed bulls were at least 2 years old (branch-antlered bulls) during the fall hunting season immediately following capture.

Table 3. East Little Belt Mountains Elk Study capture-mortality data, Judith River Elk Herd.

Capture	No. Captured		Harvest			Cause of	
Year	Male	Female	Record by Year			Death	Remarks
1983	10	52	1983	3	males	gun	
				1	male	trap mortality	
				4	females	gun	
			1984	2	males	gun	
				1	female	gun	
			1985	2	males	gun	
				5	females	gun	
			1986	1	male	gun	
			1987	1	female	gun	
			1988	3	females	gun	
1984	13	0	1984	10	males	gun	
			1985	2	males	gun	
			1986	1	male	gun?	Died Jan. 1986, possible wound mortality.
1985	18	0	1985	15	males	gun	
			"	2	males	gun?	Found dead shortly after the gun season. Both were alive at the beginning of the gun season.
1986	17	0	1986	6	males	gun	
			"	1	male	gun?	Found dead after the gun season.
				1	male	?	Missing since 11/10/86
				1	male	?	Died spring, 1986 (accident)
				1	male	?	radio failed after 5/30/86
			1987	4	males	gun	
			1988	3	males	gun	
1987	3	10	1987	None reported killed			
			1988	2	males	gun	
1988	11	9	1988	3	males	gun	
Total	72	71		53	males	gun	
				4	males	gun?	Wounding losses
				3	males		Unaccounted for
				14	females	gun	
				1	male	accident	
				1	male	trap mortality	

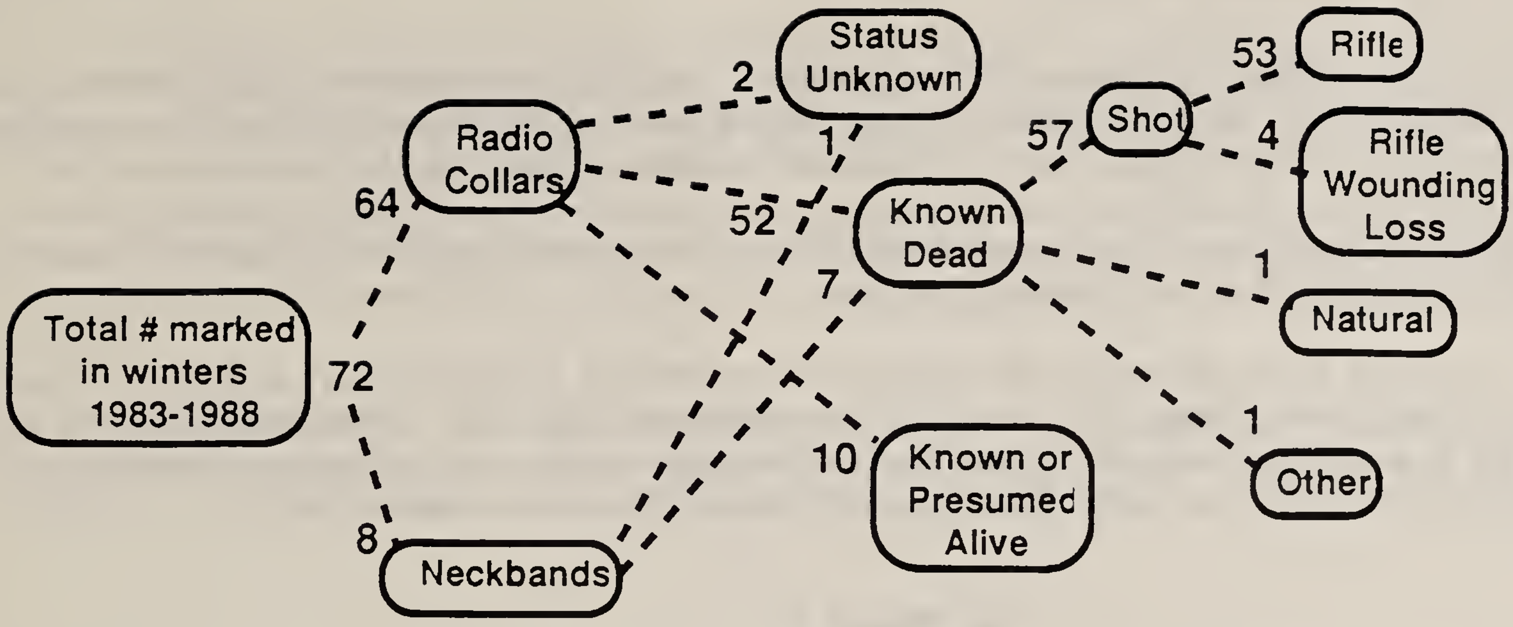

Figure 9. Status or fate of 72 male elk marked on the Judith River Wildlife Management Area.

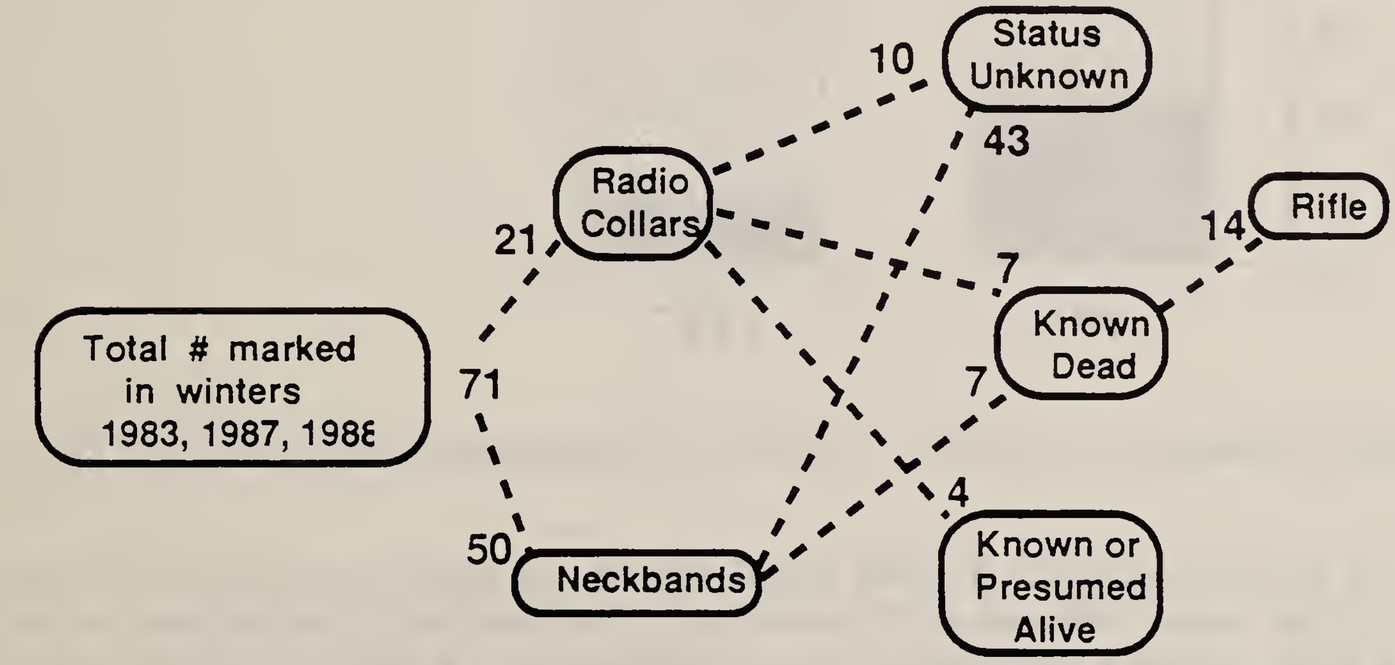

Figure 10. Status or fate of 71 female elk marked on the Judith River Wildlife Management Area.

During this time there was unlimited either-sex archery hunting from about Sept. 8 to Oct. 15 each year. Elk hunting during the general rifle season (about Oct. 20-Nov. 30) was unlimited in most of the area for any antlered elk with permit only hunting for antlerless elk. In recent years permit only hunting was established in hunting district 420. Hunting districts 413 and 414 had some either-sex elk hunting for a portion of the general rifle season.

Survival of the various year groups of radioed bulls has been variable (Table 3, Fig.9). Mortality of bulls, including wounding losses, during the first rifle hunting season after marking totaled 40, 77, 94, 41, 0, and 27 percent during 1983 through 1988, respectively. Overall, 57 of the 72 marked bulls (79%) were killed by gun hunters including 4 apparent wounding losses. A young bull died due to a natural accident, 1 died due to trapping, 3 (4%) are unaccounted for, while 10 (14%) are known to be alive.

Fourteen of the 71 females (20%) captured since 1983 have been reported killed by gun hunters (Table 3, Fig. 10). The bulk of the remaining marked females are presumed to be alive although some may have died of natural causes and/or killed and not reported by hunters.

No marked elk have been reported killed by archers even though the Little Belts receive a considerable amount of archery hunting pressure.

According to the statewide elk harvest survey, archery hunters in the Little Belts killed a total of 54 and 21 elk during 1986 and 1987, respectively (Fig. 11). This represents 34% and 13% of the Region Four total elk archery harvest for these same years. Archers accounted for 7% of the total elk harvest in the Little Belts during 1986 and 3% of the total for 1987.

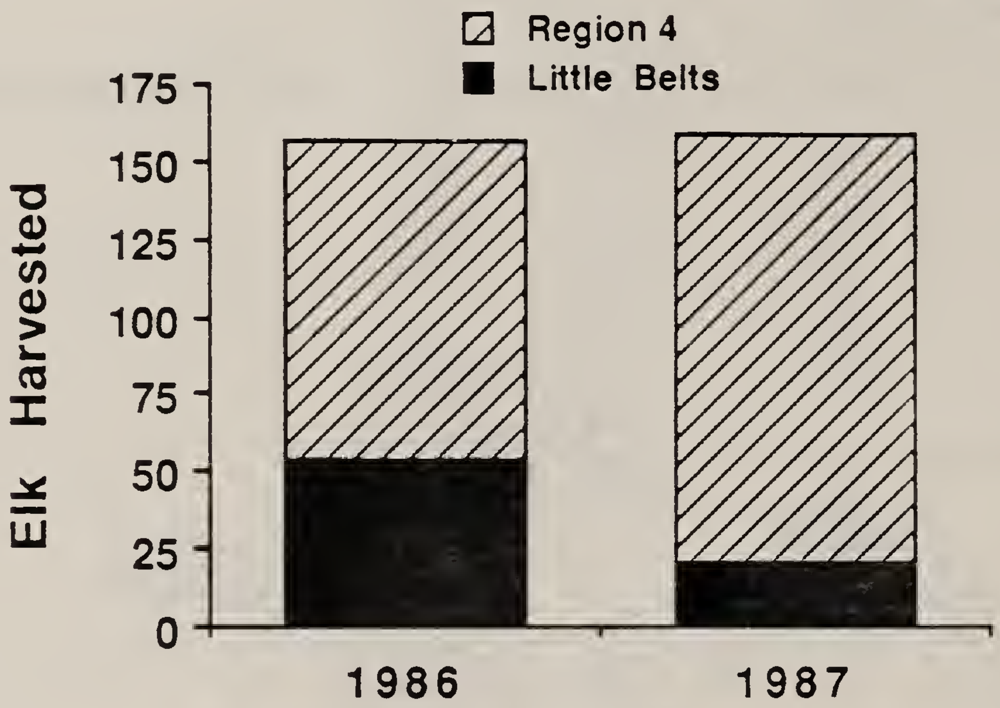

Figure 11. Little Belt Mountains vs. Region 4, MDFWP, elk harvest by archers, 1986 and 1987.

Data on total bull elk harvest for the Little Belts indicates that archers accounted for 2.6 and 1.6% of the total bull harvest in 1986 and 1987, respectively. Therefore, while harvest survey data indicated the Little Belts provide a significant amount of Region Four elk archery and gun hunting opportunity, it is obvious that archery hunters kill a very small share of the total bull harvest for the Little Belt Mountains. These data are supported by information gathered since 1983 for the Judith River elk herd in that archers have not killed any marked bull elk. Therefore, both research and hunter questionnaire survey data document that archers are not successfully competing with gun hunters for bull elk in the Little Belt Mountains.

2. Distribution of Radio Marked Elk

Intensive monitoring and relocation of radioed elk in the Little Belt Mountains during the 1987 and 1988 archery hunting seasons indicated that elk were not significantly redistributed by archery hunting.

Ten elk (6 bulls and 4 cows) with radio collars were tracked weekly from about mid-August through mid-October each year. These elk were also relocated about every 3 weeks from June 1 to mid-August during these same years. Comparisons of summer relocations vs. early fall relocations showed no consistent separation between the two categories of relocation data that would indicate archers caused a major distributional shift in how elk used the area (Figs. 12-15). Most of the differences that did occur between the two data sets were probably due to the elk choosing to use different habitat as a result of vegetation and weather changes between June 1 and Oct. 15.

In summary, the Little Belt Mountains elk population provides a considerable amount of recreational opportunity to the public during the archery hunting season while being insignificantly affected by archery hunters -- in actual kill and disturbance factors.

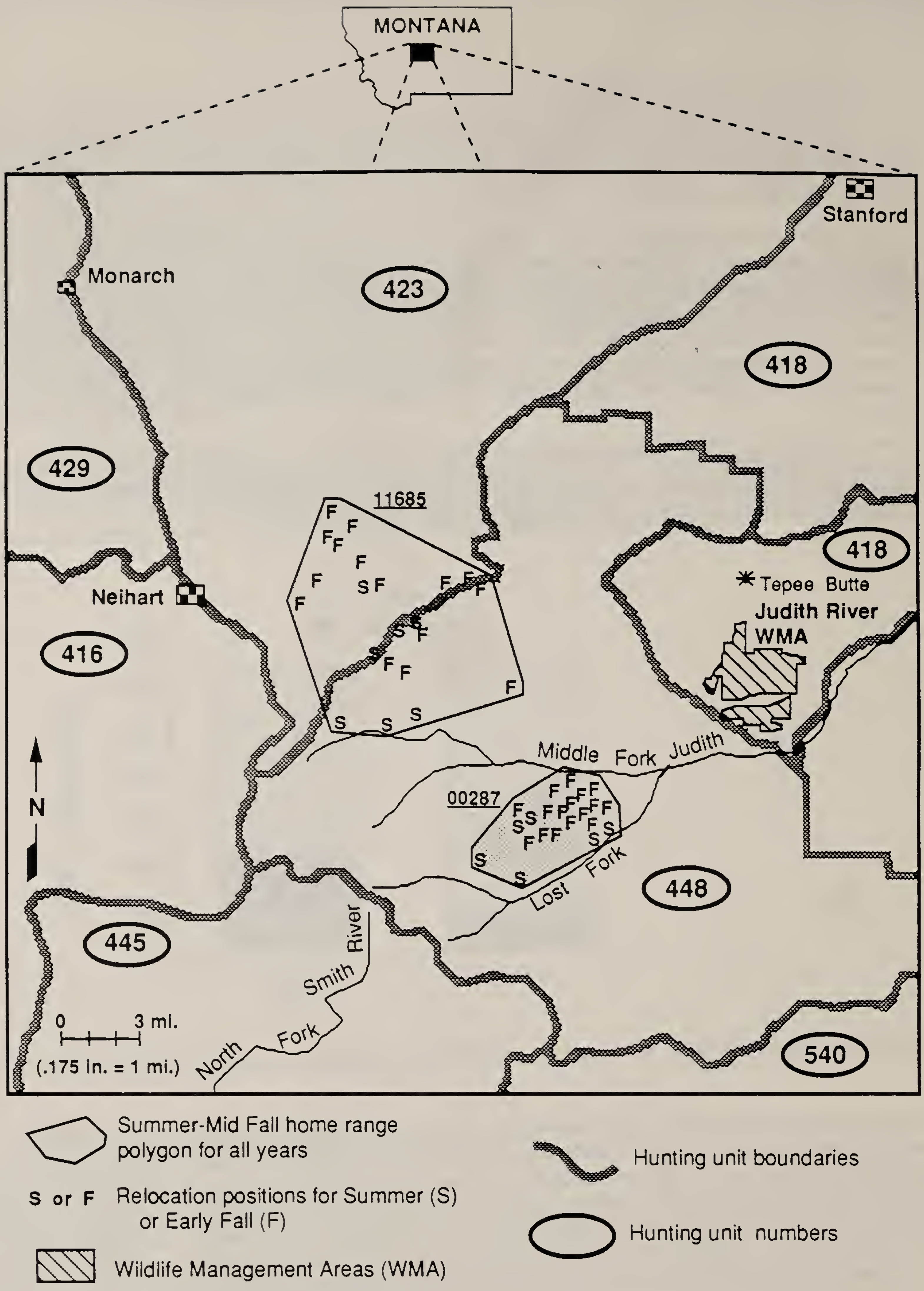

Figure 12. Comparison of summer (June 1-August 14) to early fall (August 15-October 15) relocations for 2 radio collared bull elk (11685 and 00287) during 1987 and 1988 in the Little Belt Mountains.

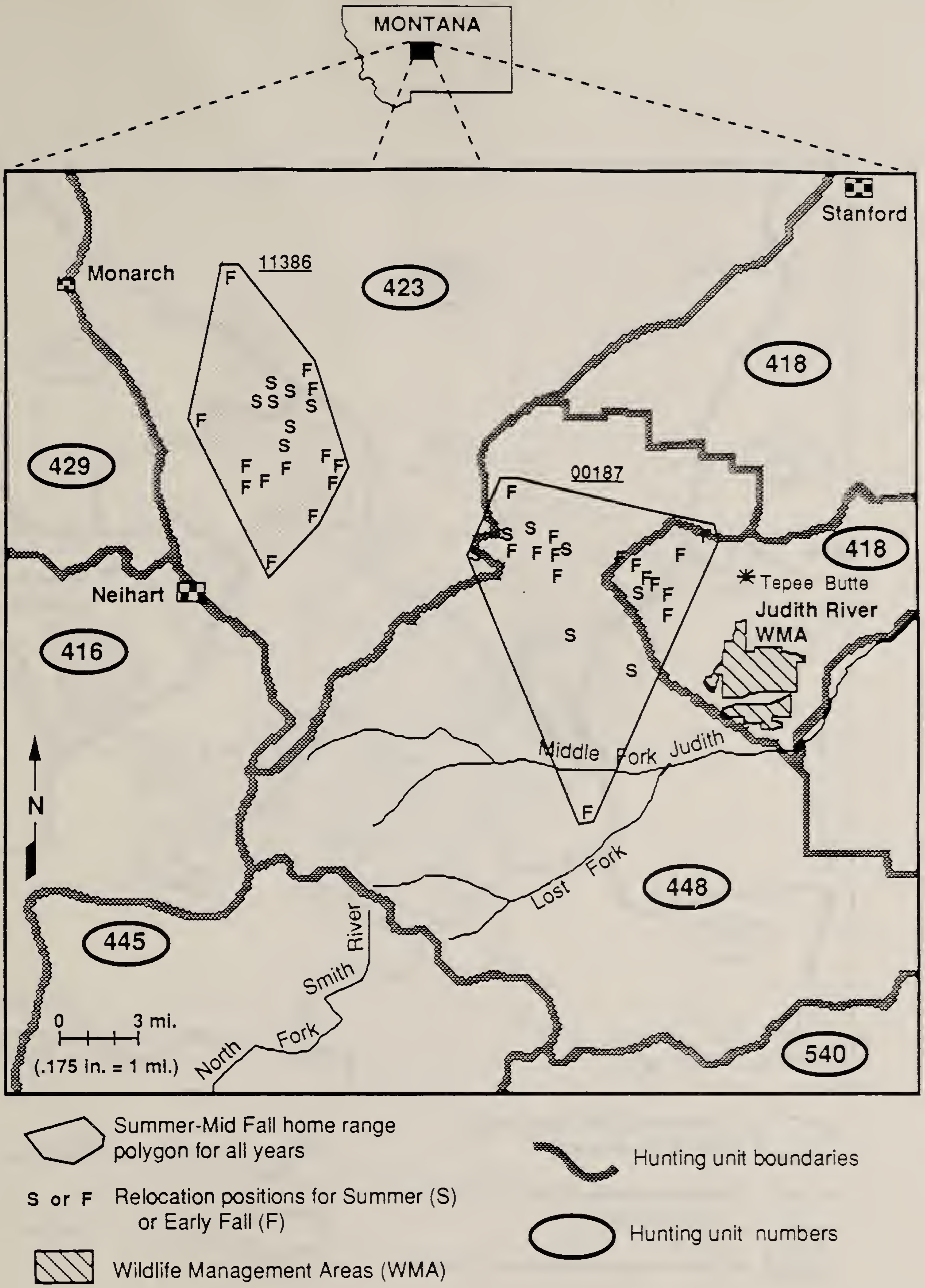

Figure 13. Comparison of summer (June 1-August 14) to early fall (August 15-October 15) relocations for 2 radio collared bull elk (11386 and 00187) during 1987 and 1988 in the Little Belt Mountains.

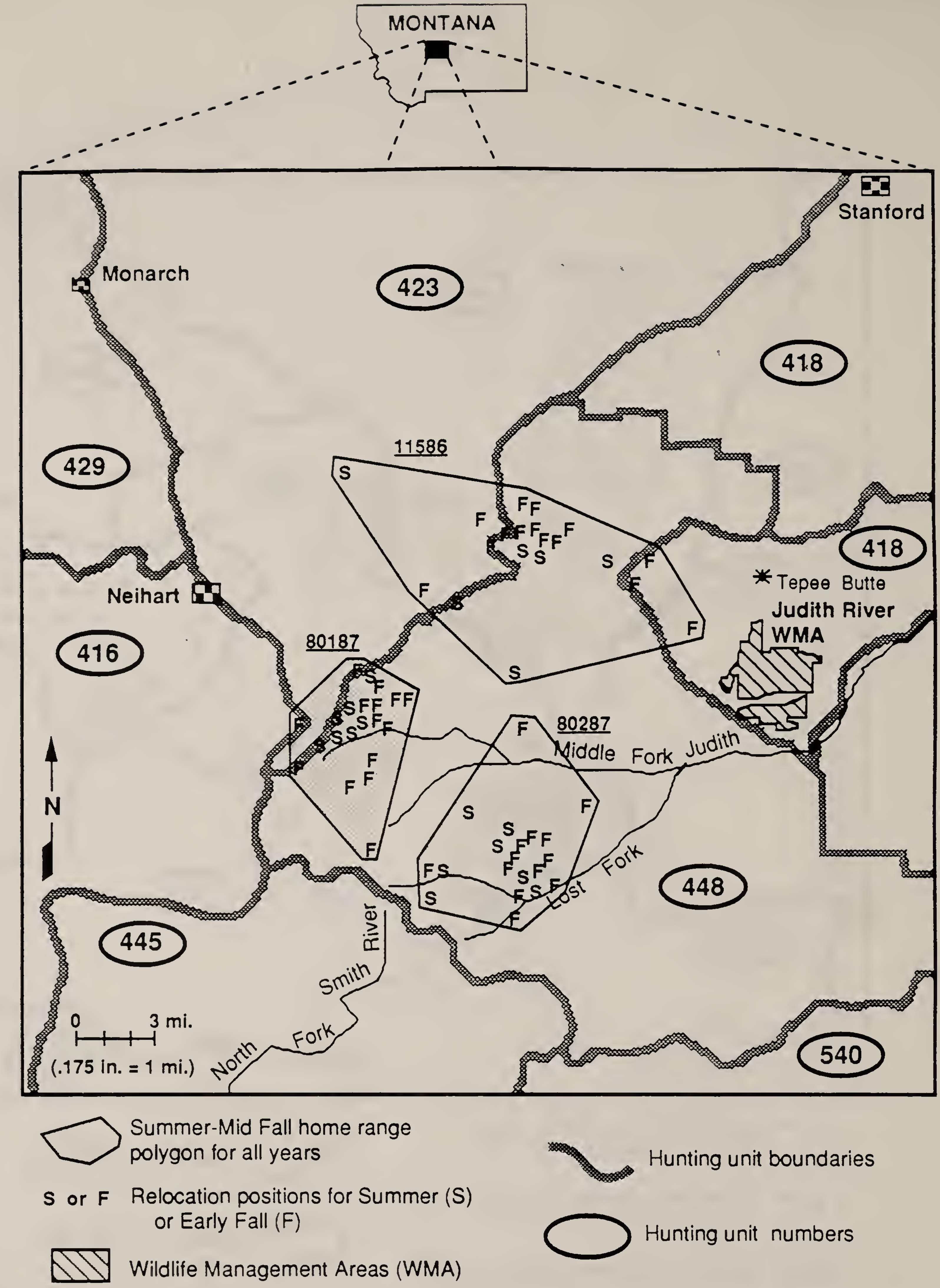

Figure 14. Comparison of summer (June 1-August 14) to early fall (August 15-October 15) relocations for 2 radio collared cow elk (80187 and 80287) and 1 radio collared bull elk (**11586**) during 1987 and 1988 in the Little Belt Mountains.

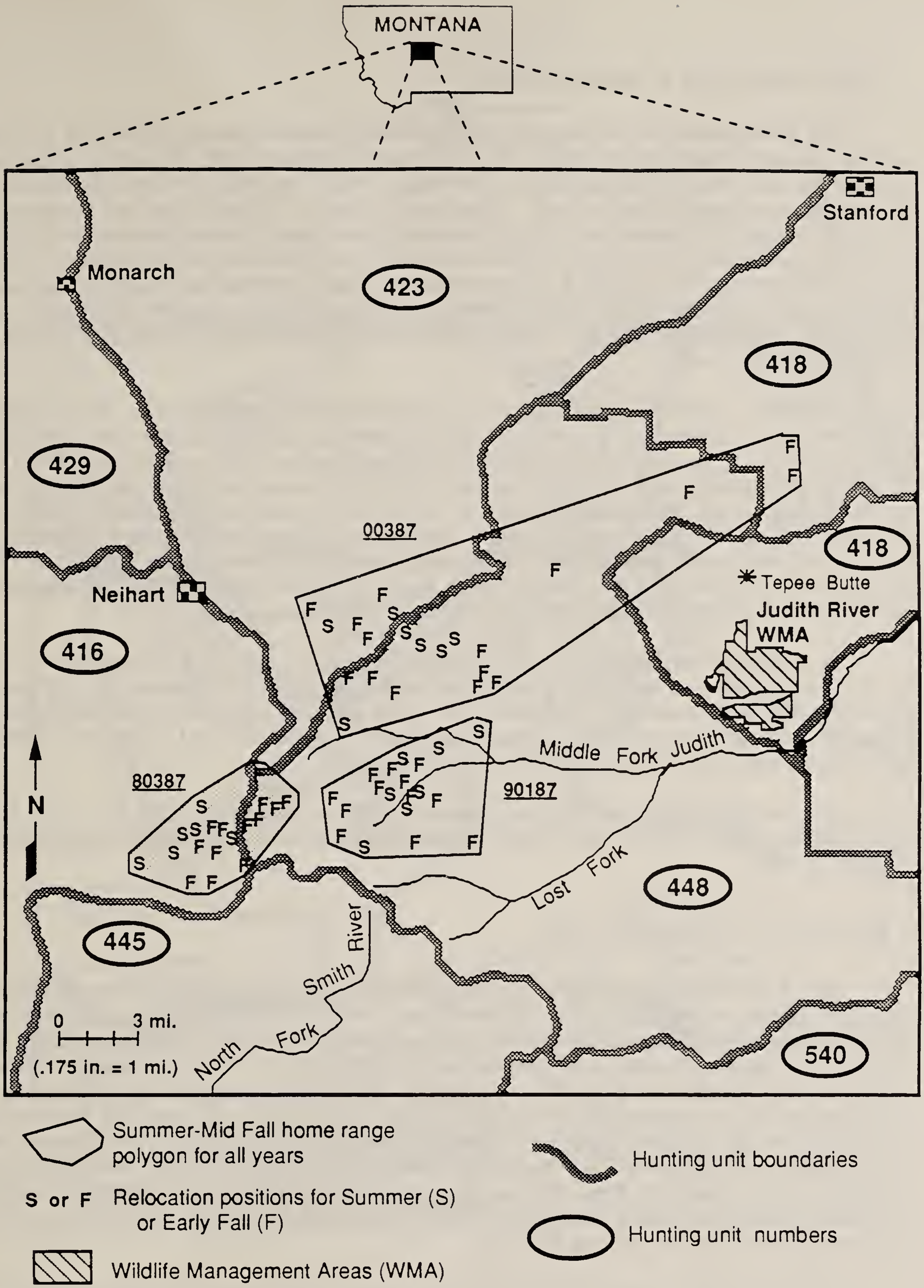

Figure 15. Comparison of summer (June 1-August 14) to early fall (August 15-October 15) relocations for 2 radio collared cow elk (**80387** and **90187**) and 1 radio collared bull elk (**00387**) during 1987 and 1988 in the Little Belt Mountains.

C. THE GRAVELLY MOUNTAINS

Elk management in Montana has been primarily directed toward increasing elk numbers and maintaining a diversity of choice in elk hunting opportunity. However, either-sex elk hunting has decreased substantially from the early 1960s. In 1963, 67% of Montana's hunted elk habitat was open to season-long either-sex hunting; by 1985 this had dropped to 1%. Although hunting for antlered bull elk has remained quite liberal, branch-antlered bull only areas have been increasing. In the early 1960s elk hunting in Montana was unrestricted for bulls. By 1985, 3% of Montana's elk habitat was restricted to branch-antlered bull hunting. Depending on the area, this restriction resulted from either some hunters wanting a better opportunity to harvest an older or "trophy" bull or the concern over the long term biological affects of yearling bulls siring most of the calves.

Available evidence suggested that low proportions of mature bulls in elk populations might negatively affect calf production and/or survival, and population size. Low observed calf:cow ratios in the Gravelly Mountains during the winters of 1979-1980 and 1980-1981 (18-35 calves/100 cows versus 55-68/100 during 1970-1975) coincided with low antlered-bull/cow ratios. Concern over these ratios resulted in changes in hunting regulations in hunting district (HD) 324 during 1981. The early archery season was eliminated, and the bull harvest during the general elk season was limited to branch-antlered bulls to increase the number of 2 1/2 year old bulls for the breeding season in future years. The branch-antlered bull regulation was implemented in several adjacent hunting districts in subsequent years.

A study was initiated in January, 1984, to assess the role and importance of various hunting strategies and differing kinds and levels of hunting pressure on elk population characteristics and dynamics. Emphasis has been and will continue to be directed toward breeding biology, reproductive success and calf recruitment, and seasonal distribution, movements, and habitat use of adult males and females.

Beginning in 1988 the archery season was re-established in HD 324. The following information on the effect of this on elk in this hunting district is from the long term elk study initiated in 1984.

1. Distribution of Radio Marked Elk

Ten and 13 radio-marked elk in and adjacent to this hunting district were tracked weekly from late August to mid-October in 1986-1988 and 1987-1988, respectively. Tracking was done from the air in a Piper Super Cub. Some of these elk were not found during every flight, but they were still included in the analysis. Comparisons of 1986-1987 or 1987 (pre-archery) relocations to 1988 (archery) relocations showed no consistent distributional response of these elk to the re-establishment of the archery season in 1988 (Figs. 16-26). Most of these elk showed a strong intermixing of late summer to mid-fall relocations between 1986-87 and 1988. Four of these elk (91186, 91986, 70186, and 90487) showed some shift in distribution between 1986-1987 and 1988 (Figs. 16, 17, and 19). It is unknown how much of this shift was due to the re-establishment of archery hunting in hunting district 324. These limited results indicate archers caused no major distributional shift in how elk use HD 324.

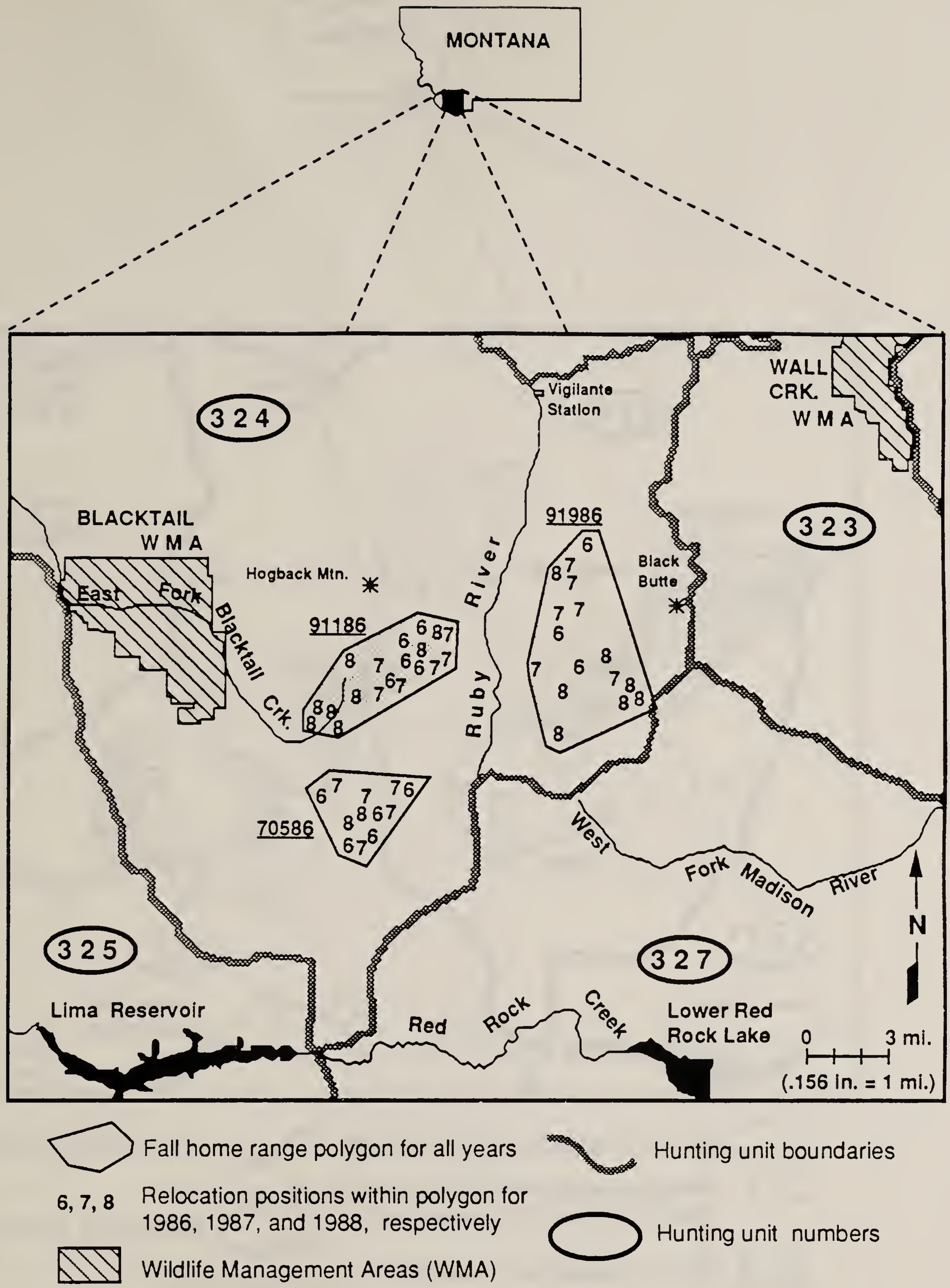

Figure 16. Comparison of pre-archery (1986 &1987) to archery (1988) early fall (August 15-October 15) relocations for 3 radio collared cow elk (70586 , 91186, and 91986) in hunting district 324 in the Gravelly Mountains.

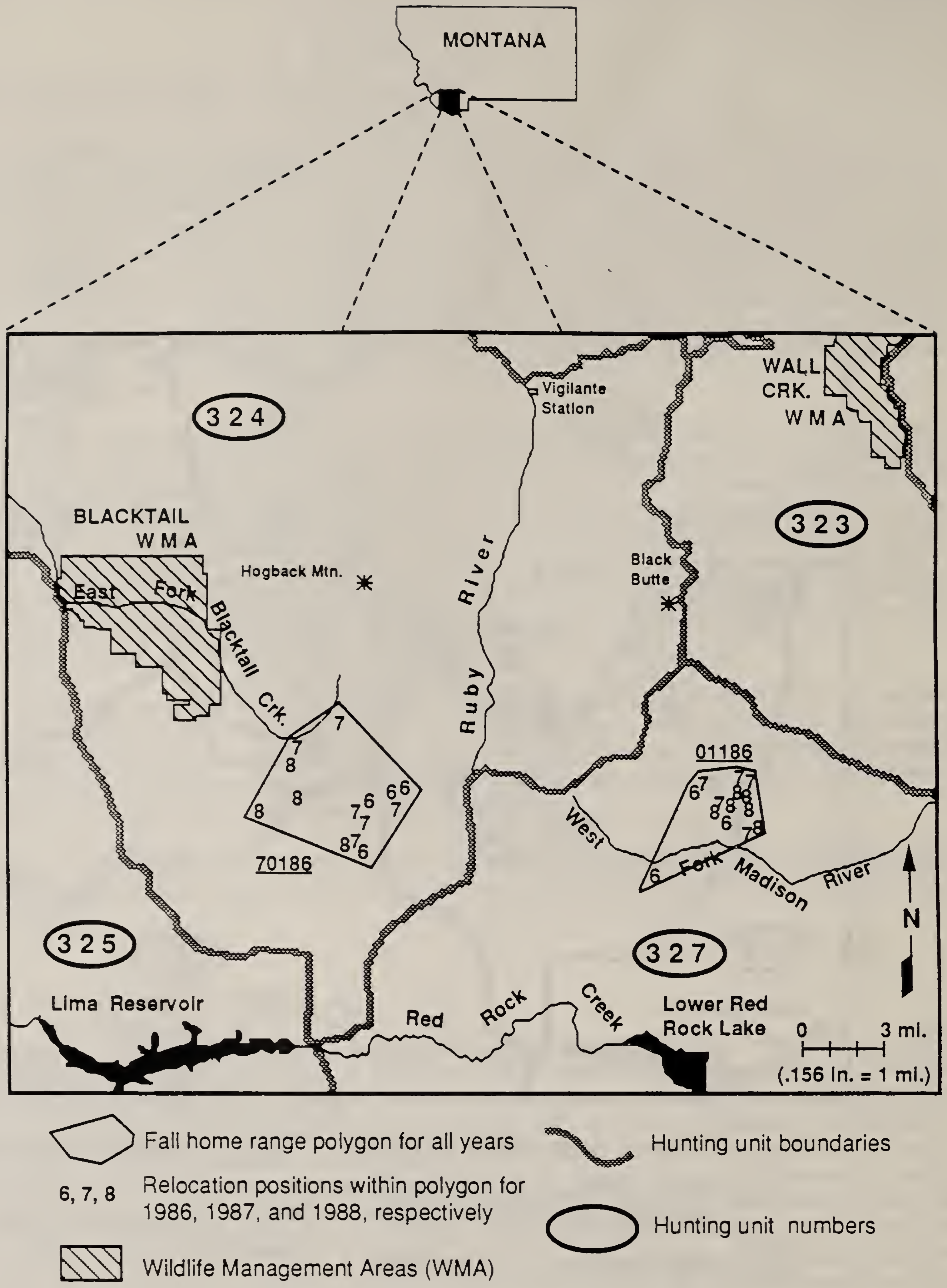

Figure 17. Comparison of pre-archery (1986 &1987) to archery (1988) early fall (August 15-October 15) relocations for radio collared cow elk (70186) and bull elk (01186) in or near hunting district 324 in the Gravelly Mountains.

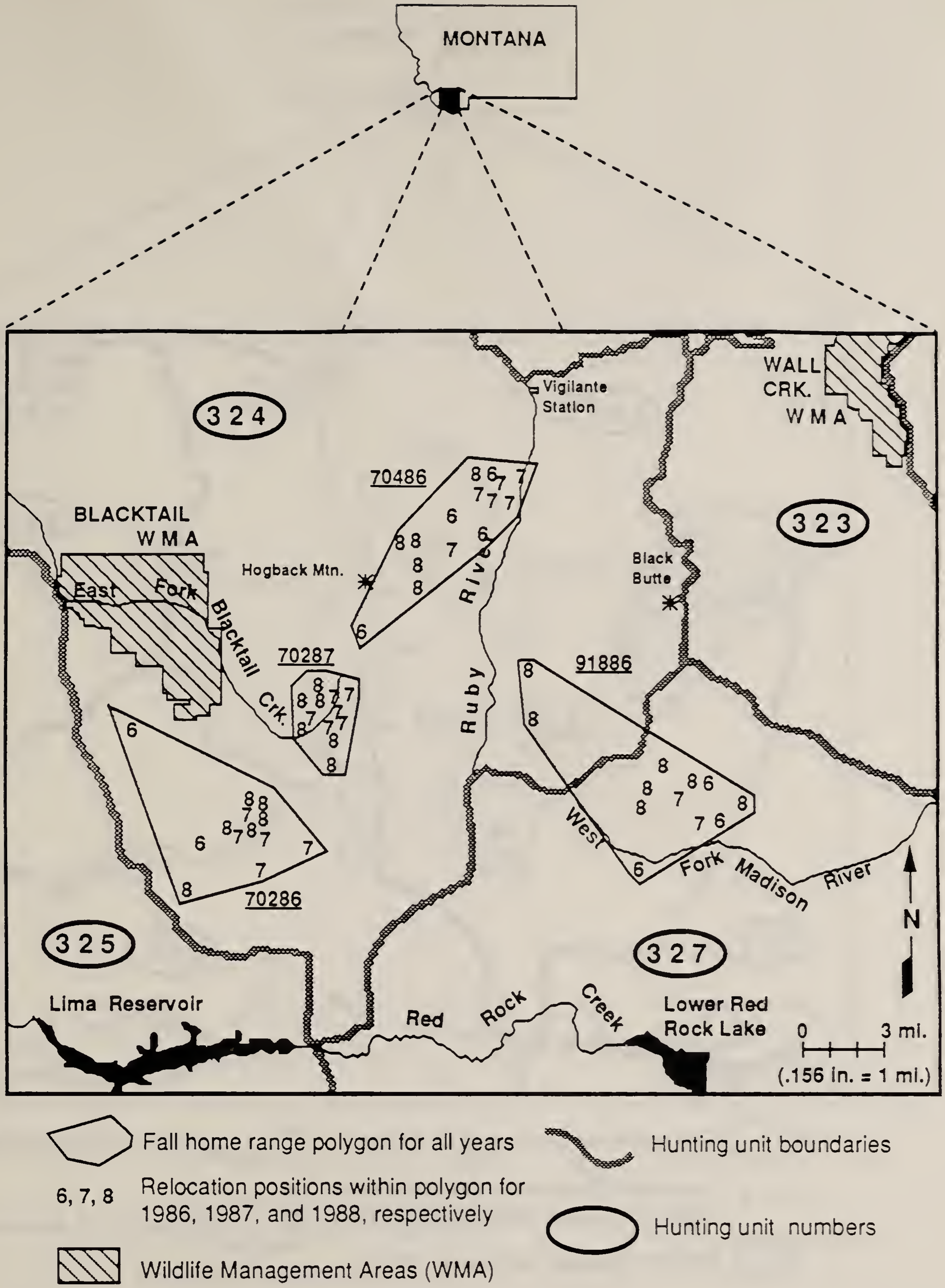

Figure 18. Comparison of pre-archery (1986 &/or 1987) to archery (1988) early fall (August 15-October 15) relocations for 4 radio collared cow elk (70286 , 70486, 91886, and 70287) in hunting district 324 in the Gravelly Mountains.

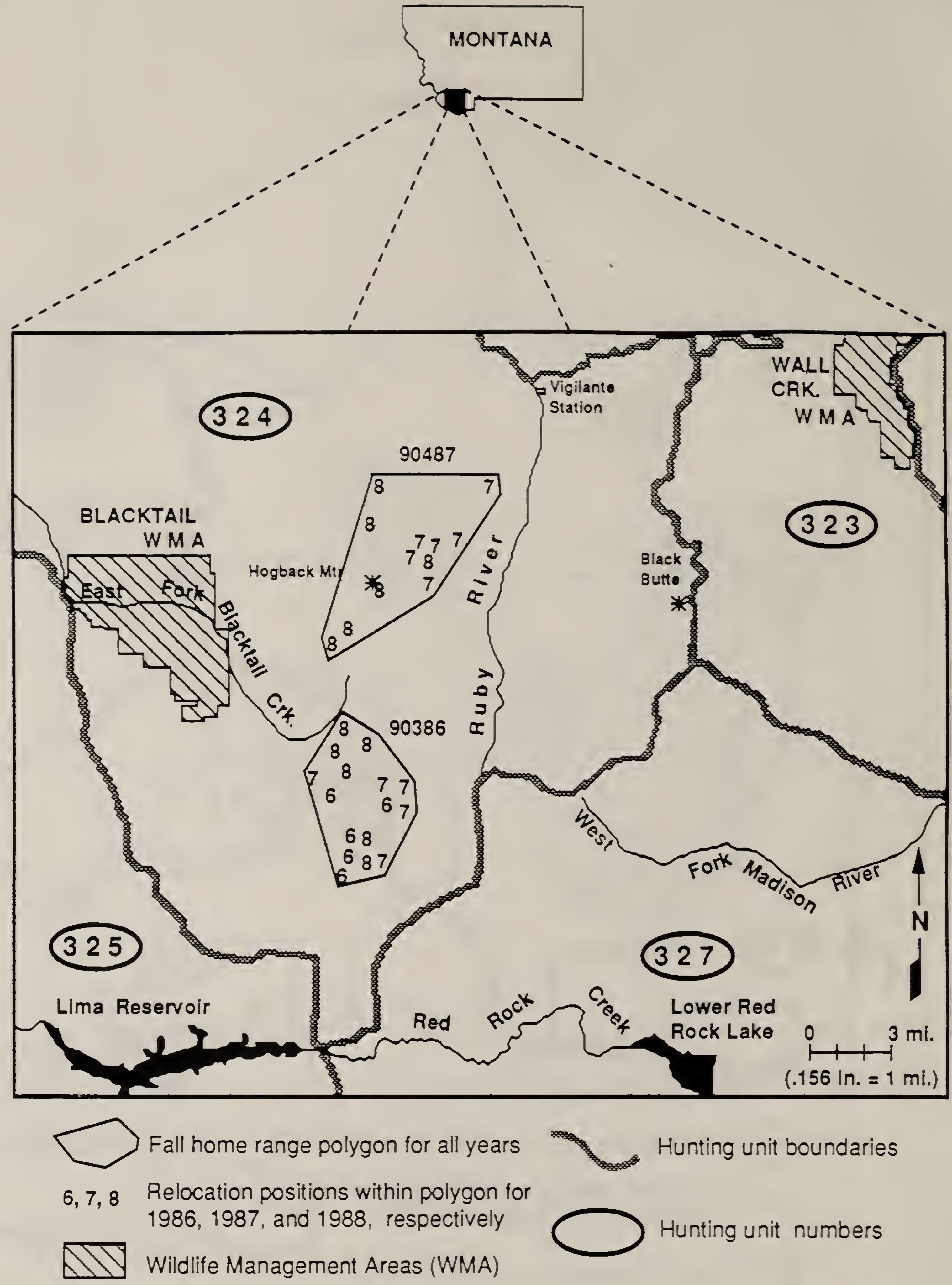

Figure 19. Comparison of pre-archery (1986 &/or 1987) to archery (1988) early fall (August 15-October 15) relocations for 2 radio collared cow elk (90386 and 90487) in hunting district 324 in the Gravelly Mountains.

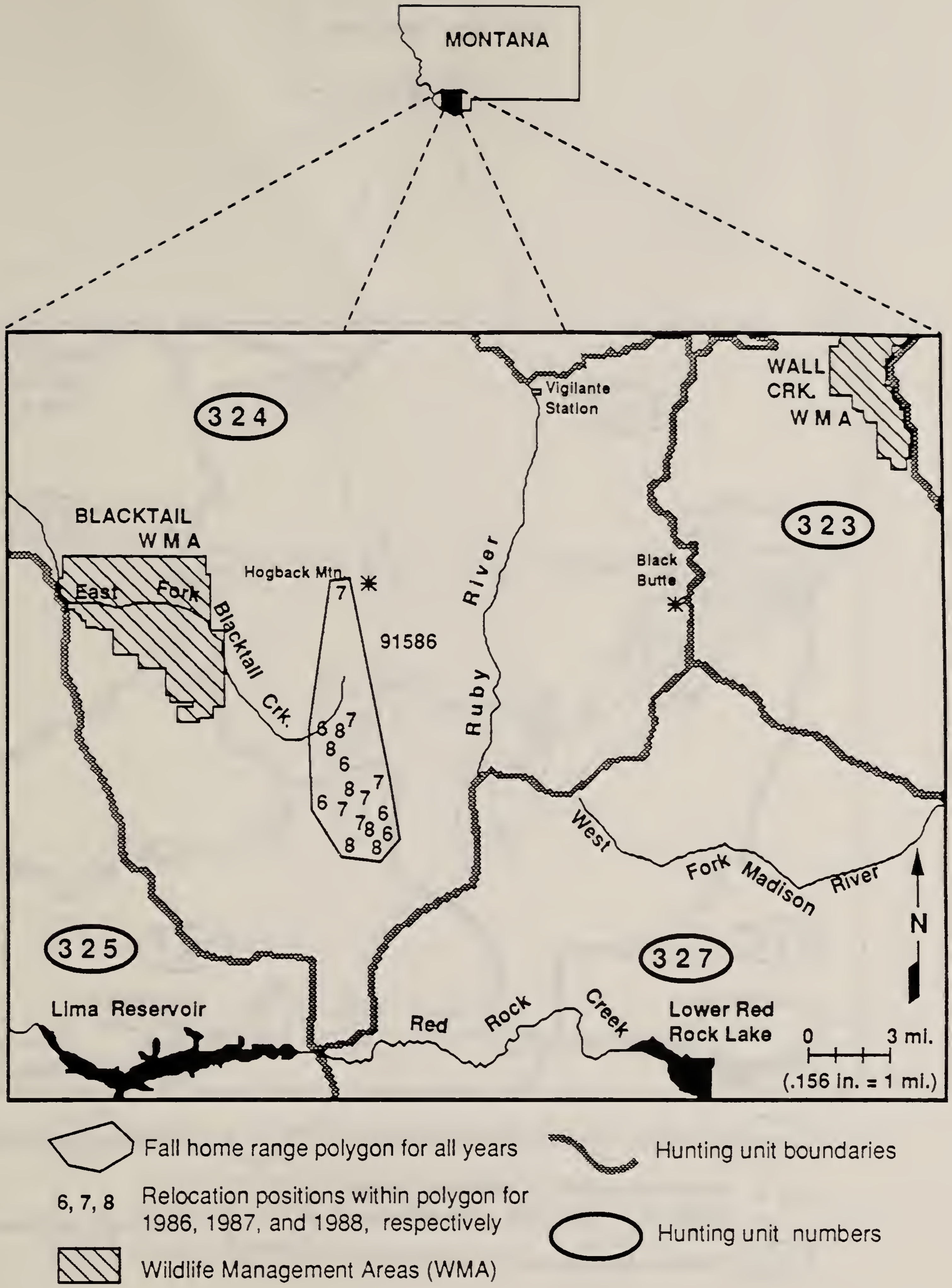

Figure 20. Comparison of pre-archery (1986 &1987) to archery (1988) early fall (August 15-October 15) relocations for a radio collared cow elk (91586) in hunting district 324 in the Gravelly Mountains.

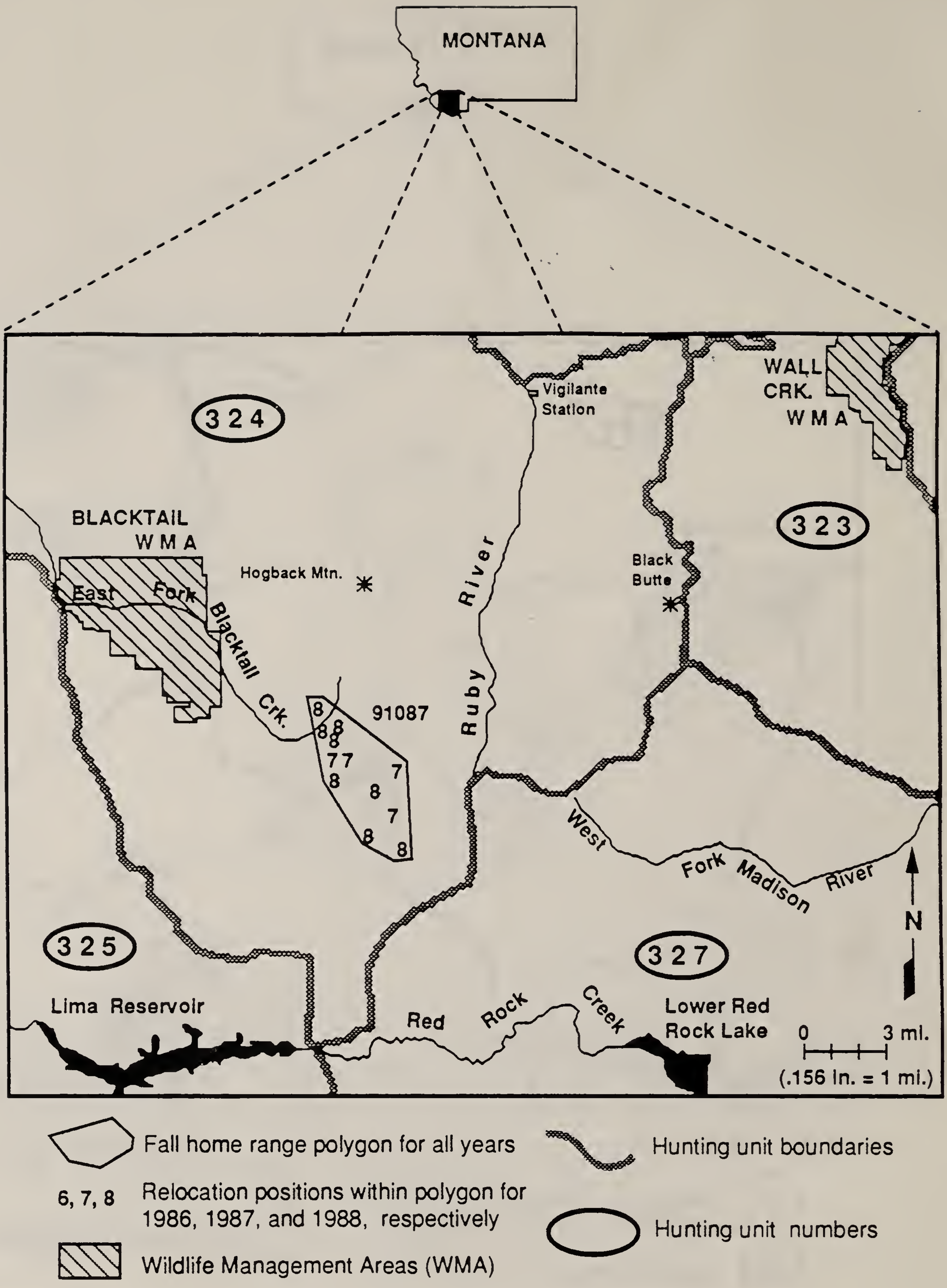

Figure 21. Comparison of pre-archery (1987) to archery (1988) early fall (August 15-October 15) relocations for a radio collared cow elk (**91087**) in hunting district 324 in the Gravelly Mountains.

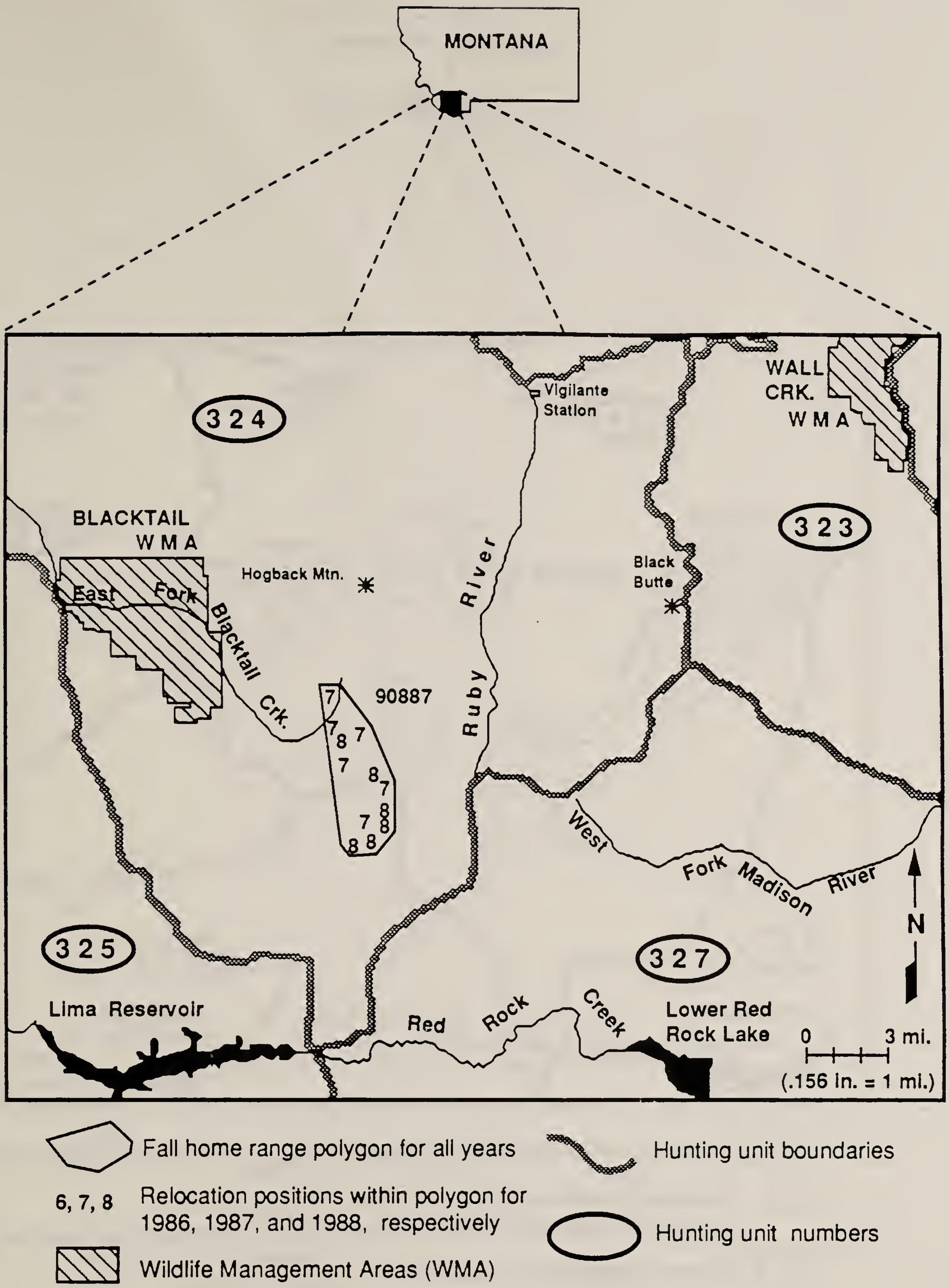

Figure 22. Comparison of pre-archery (1987) to archery (1988) early fall (August 15-October 15) relocations for a radio collared cow elk (90887) in hunting district 324 in the Gravelly Mountains.

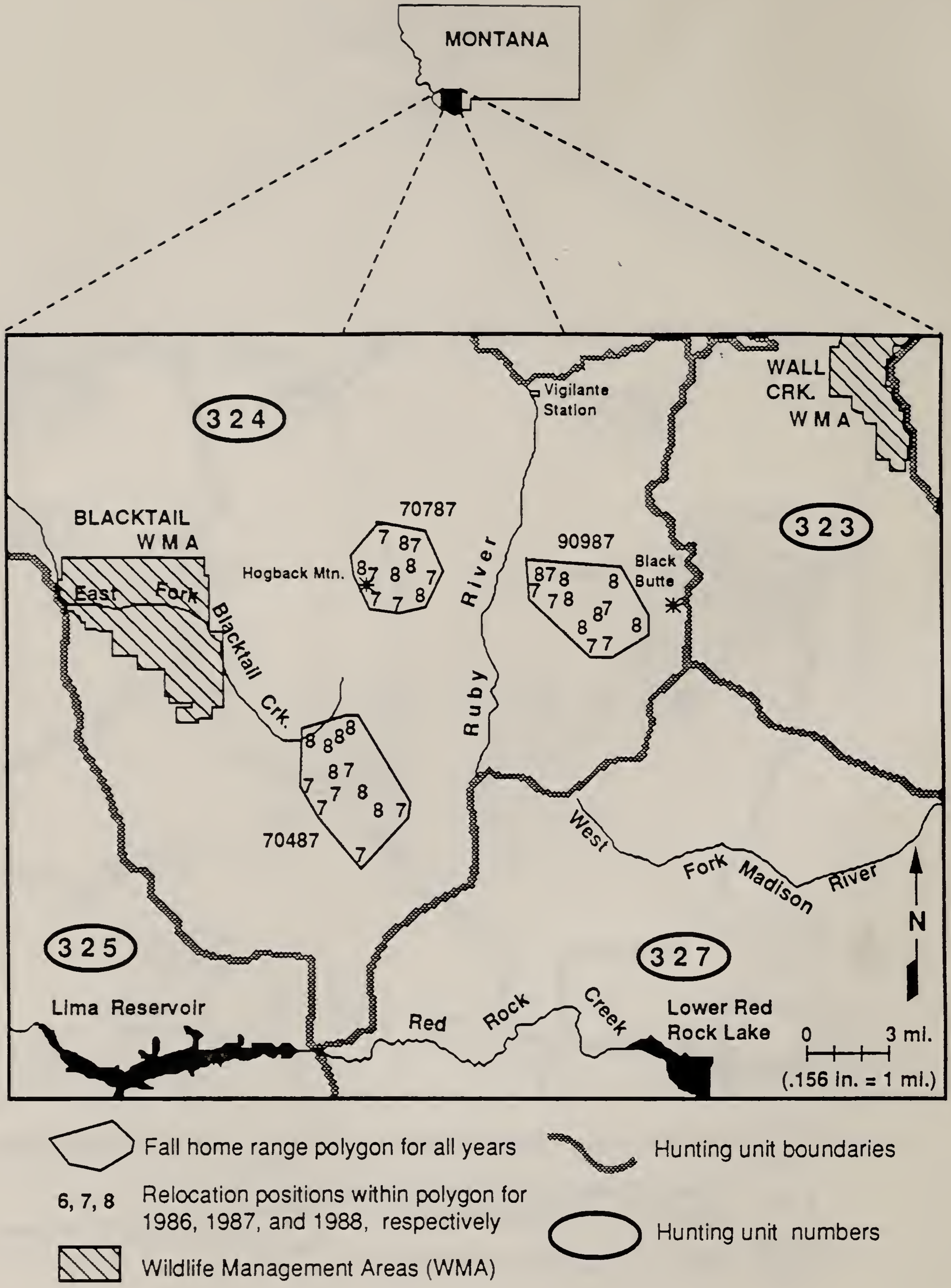

Figure 23. Comparison of pre-archery (1987) to archery (1988) early fall (August 15-October 15) relocations for 3 radio collared cow elk (70487 , 70787, and 90987) in hunting district 324 in the Gravelly Mountains.

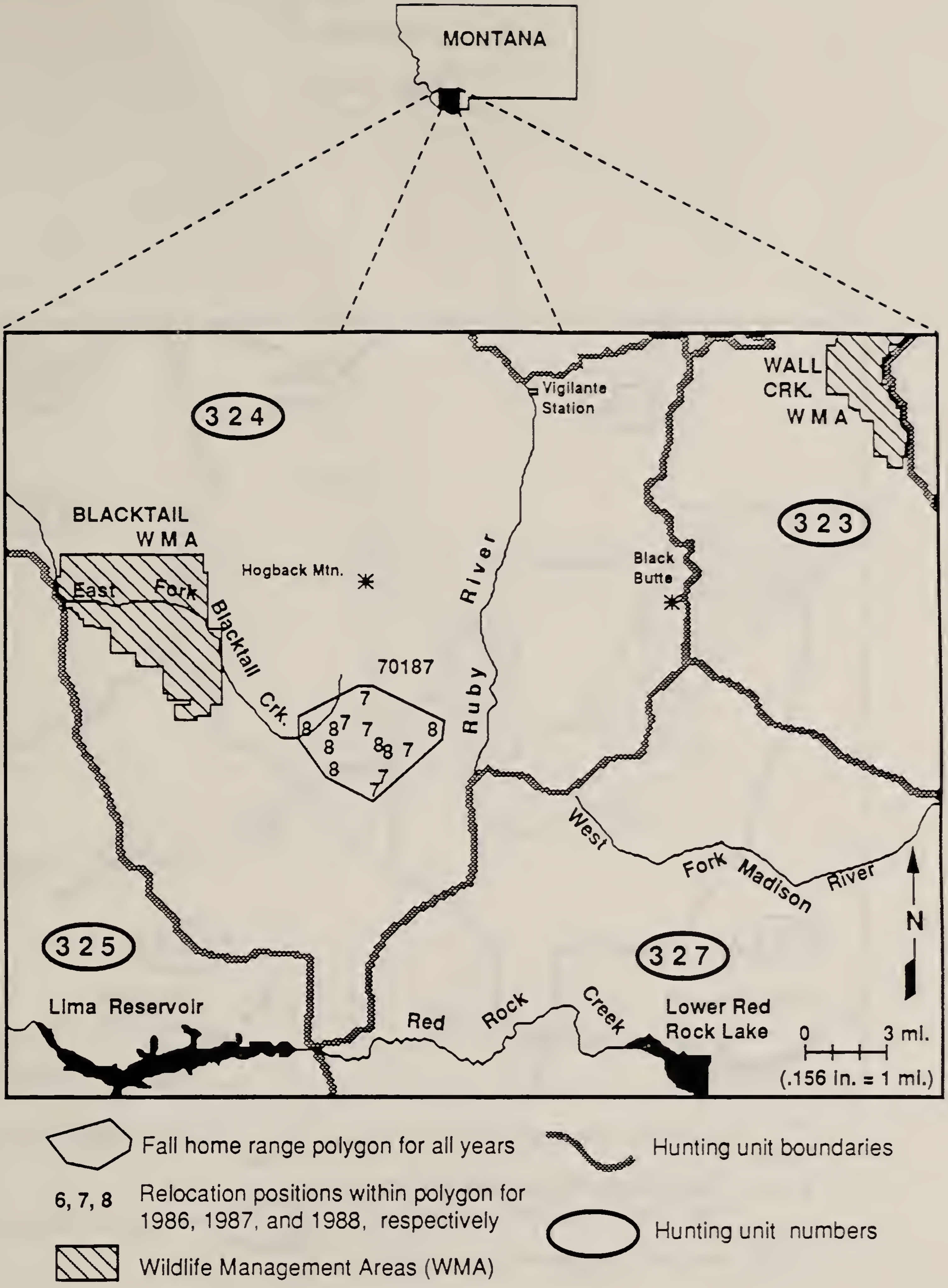

Figure 24. Comparison of pre-archery (1987) to archery (1988) early fall (August 15-October 15) relocations for a radio collared cow elk (70187) in hunting district 324 in the Gravelly Mountains.

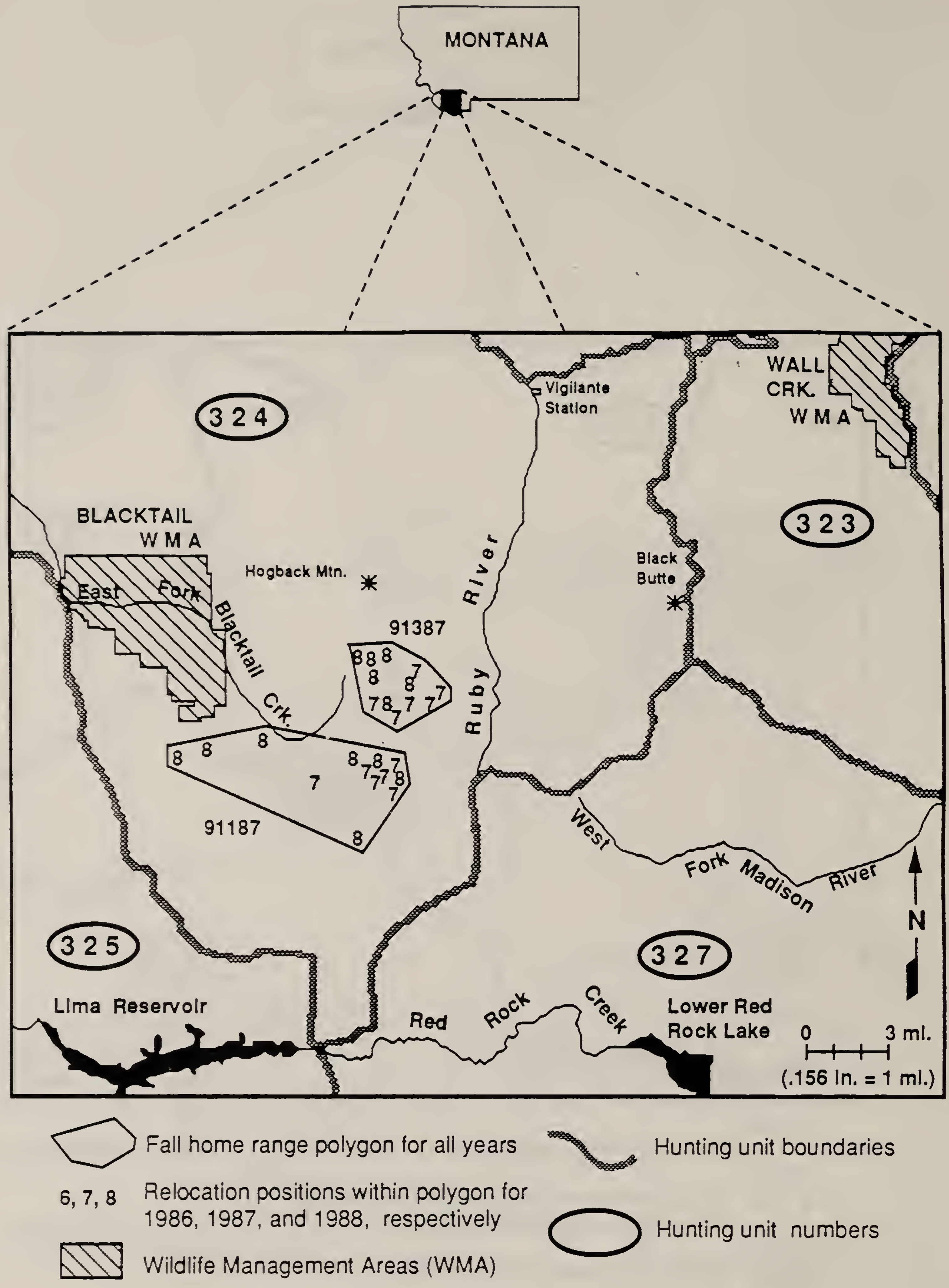

Figure 25. Comparison of pre-archery (1987) to archery (1988) early fall (August 15-October 15) relocations for 2 radio collared cow elk (91187 and 91387) in hunting district 324 in the Gravelly Mountains.

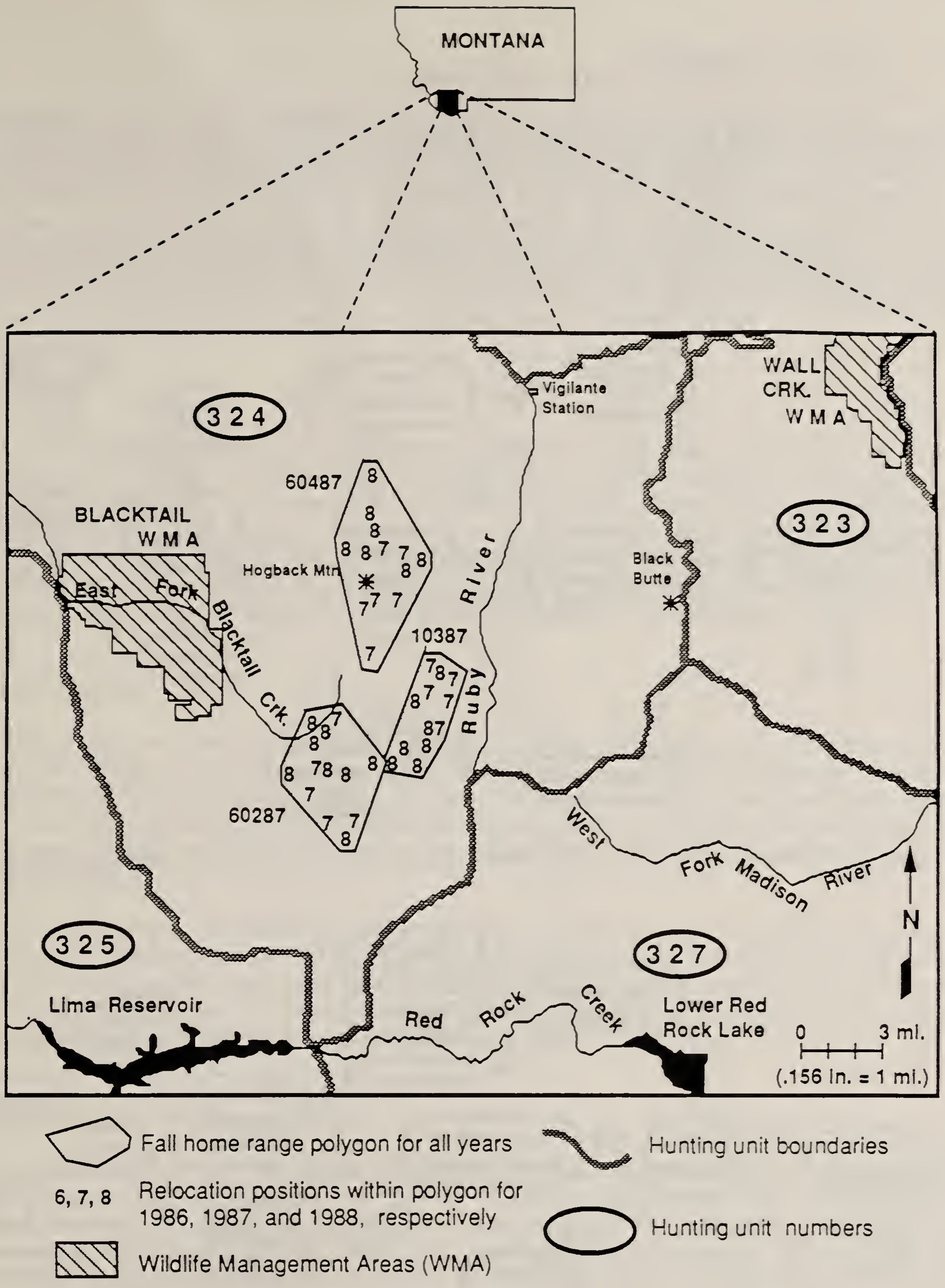

Figure 26. Comparison of pre-archery (1987) to archery (1988) early fall (August 15-October 15) relocations for 2 radio collared cow elk (60287, 60487, and a bull elk 10387) in hunting district 324 in the Gravelly Mountains.

2. Mortality of Marked Elk

Since 1984, only 4 (3.7%) of 110 documented hunter kills of 374 marked animals available to hunters have been due to archery hunting (Figs. 27-28). These include: a female marked as a newborn in 1984, recaptured in 1985, and taken by an archer in 1986; a branch-antlered bull taken in HD 330 in 1985; a cow taken in HD 323 in 1988; and a branch-antlered bull crippling loss in HD 324 in 1988. Of the 106 marked elk killed by rifle hunters, 5 were crippling losses. It is apparent that the proportion of hunter kills of marked elk attributable to archers is small, and reestablishing archery hunting in HD 324 in 1988 did not seem to change this appreciably.

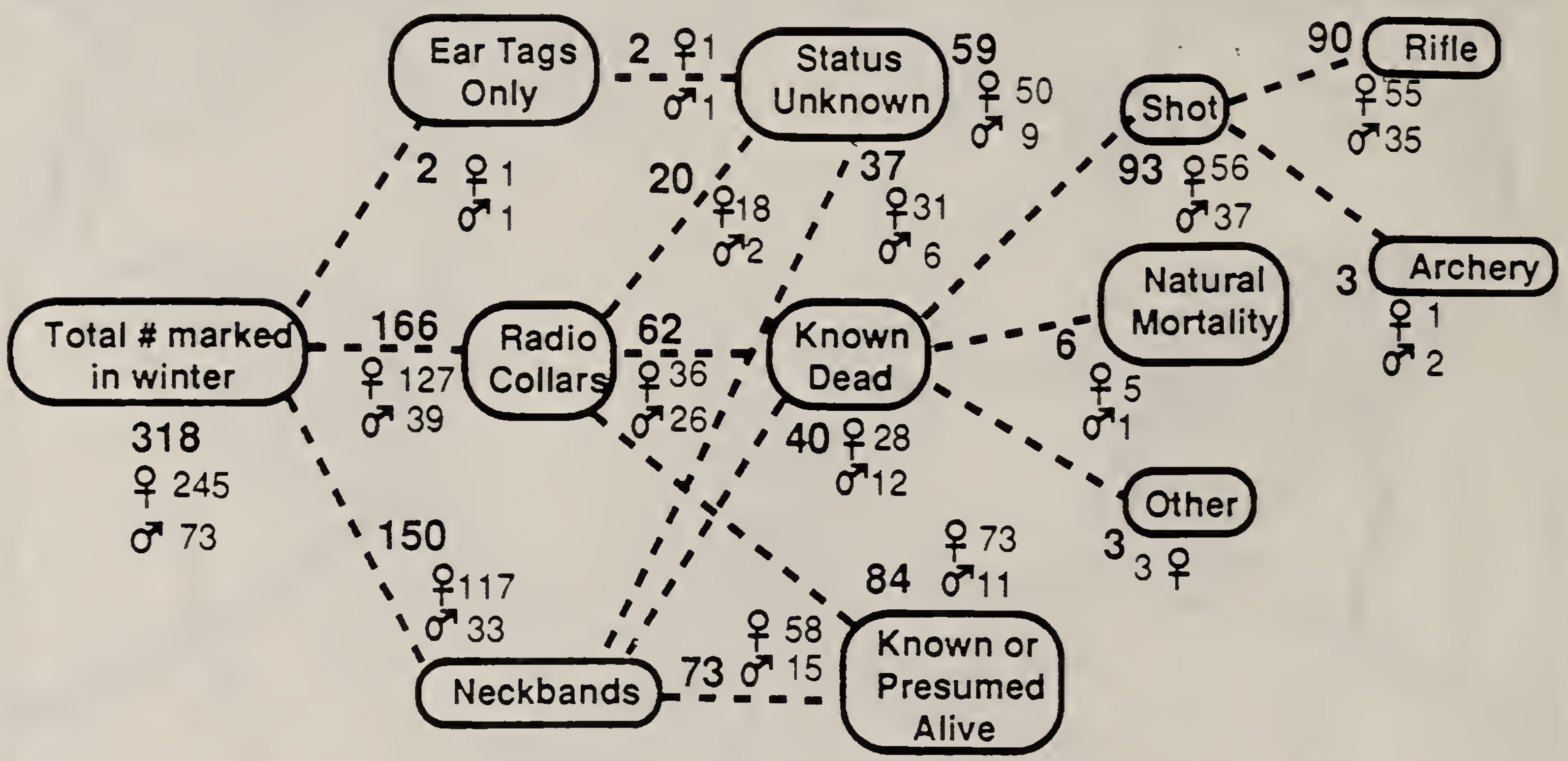

Figure 27. Status or fate of 318 elk marked in the Gravelly Mtn. Area during the winters 1984-88.

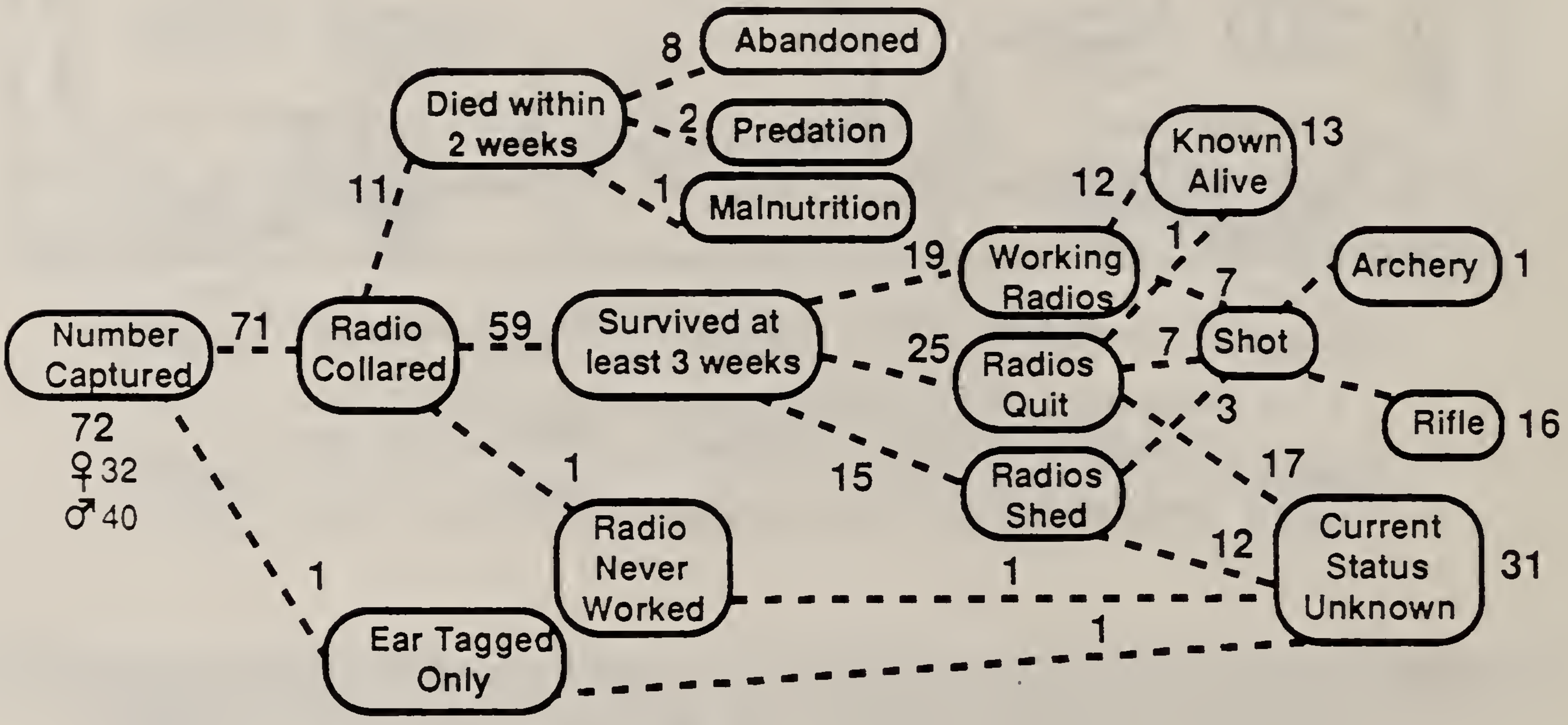

Figure 28.Status or fate of 72 newborn elk marked in the Gravelly Mtn. Area during the spring 1984-88.

IV. SURVEY OF RESOURCE AGENCIES

States and provinces are at different stages in managing archery hunting for elk. A survey of their cumulative experience should allow the MDFWP to anticipate problems of the future and to judge the effectiveness of management options that have been tried elsewhere.

An archery elk hunting survey was subsequently sent to 10 state and provincial fish and game agencies in the Rocky Mountain West. The purpose of the survey was to gather information on elk archery seasons, participation rates, harvest success and trends, existing public and management concerns, and special measures used to address elk archery issues.

A. The Survey

A cover letter explaining the project and a six-part survey were sent to fish and game agencies in eight western states and two Canadian provinces in July 1987 (Appendix 1). Information for Montana was also supplied. Surveys were addressed to state/provincial representatives to the 1986 Western States and Provinces Elk Workshop. Agencies provided harvest and license data for the 1986 hunting season and harvest and license trend data for the previous five years (1982-1986), unless otherwise specified. Archery season structures for 1987 were analyzed. A follow-up letter or telephone call was necessary in some cases.

B. Archery Seasons

All jurisdictions surveyed have special early archery seasons prior to the general rifle hunting season (Table 4). These seasons range in length from 8 to 43 days and typically include at least part of the elk breeding season. When elk are in the rut, archers have the opportunity to call bulls into close range to enhance their effectiveness in hunting. Many agencies have experimented with early season length and timing for many years, while British Columbia just recently initiated early archery seasons.

Five states/provinces also have regular late-season archery hunts in several hunting units for elk (Table 4). These are typically permit-only, either-sex hunts in a small number of areas. Success rates on late season hunts on winter ranges tend to be higher than early fall hunts with up to 87% success in some areas in Wyoming. Three states/provinces also allow hunters to use bows during the general season: Montana, New Mexico, and Alberta.

C. Archery Hunter Numbers and Trends

The number of archery elk hunters participating in the 1986 season in the 11 (including Montana) areas sampled varied greatly (Table 5). Based on agency estimates, 84,845 people hunted elk with a bow in 1986 in the 11 states/provinces sampled. This compares to an estimated 606,000 hunters participating in the general rifle seasons in the same areas. In each state or province, bow hunters typically comprise 7-15% of the elk hunters afield (Fig. 29). The exception occurs in Arizona where 36% of all elk permits are set aside for bow hunters. In terms of five-year trends, six states or provinces reported a moderate increase in the number of bow hunters, three were basically stable, and two experienced some decline in bow hunters during the last five years (Table 5).

Table 4. Elk archery season structures in 9 western states and 2 Canadian Provinces in 1987.

State/ Province	Early Season Dates	Length (days)	Regular Late Seasons	Comments
Arizona	Sept. 11-24	14	No	Permits only, choice of bow or gun, generally either sex
Colorado	Aug. 15-Sept. 20	37	No	Unlimited licenses, choice of bow or gun. Bulls only in August, then either-sex
Idaho	Sept. 5-Oct. 2	28	Yes, in Nov/Dec Permits	Unlimited licenses, either-sex 2 areas, Aug.1-Oct.2
Montana	Sept. 5-Oct. 17	43	No	Unlimited resident licenses 17,000 nonresident quota either-sex
New Mexico	Sept. 5-18	14	No	Unlimited licenses choice of bow hunting in Sept. or during gun season either-sex
Oregon	Aug. 22-Sept. 20	30	Yes, in Nov/Dec Permits	Unlimited licenses choice of bow or gun either-sex in most areas
Utah	Sept. 5-20	16	No	Unlimited licenses bulls only and small number of hunter-choice permits
Washington	Oct. 1-15	15	Yes, in Nov/Dec	Unlimited licenses choice of bow or gun either-sex
Wyoming	Sept. 1-30	30	Yes, in Oct/Nov Permits	Unlimited licenses legal sex varies by area
Alberta	Aug. 19-Sept. 8 Aug. 26-Sept. 8 Sept. 8-15 Sept. 1-15 Sept. 14-Oct. 3	21 14 8 15 20	Yes, in one area Sept.1-Nov. 28	Unlimited licenses guides required in most areas for nonresidents either-sex
British Columbia	Aug. 20-31 Sept. 1-20	12 20	No	Unlimited licenses in Aug. in Sept. permits for residents only either-sex

Table 5. Estimates of archery hunter numbers and success rates for 1986 with a summary of trends in hunter numbers and elk harvest.

State/ Province	Number of Bowhunters	Elk Harvest	Success Rate (%)	5 year trends	
				Hunters	Harvest
Arizona	3,608	567	16	Stable[1]	Up
Colorado	11,671	1,189	10	Up	Stable
Idaho	11,800	900	8	Down	Up
Montana	12,679	738	6	Up	Stable
New Mexico	10,317	414	14	Up	Up
Oregon	15,589	1,574	10	Stable	Stable
Utah	1,910	235	12	Up	Up
Washington	10,927	799	7	Down[2]	Up
Wyoming	4,605[3]	454[3]	10	Up	Stable
Alberta	1,439	82	6	Up	Stable
British Columbia	300	15	5[4]	Stable	Stable
Totals	8,845	6,967	8	----	----

[1] Trend in archery hunter numbers was increasing until 1984 when Arizona went to a set number of archery permits; 36% of all elk permits are now allotted to archers.

[2] Sale of archery tags went down in 1984 when Washington went to a choice of bow or gun regulation. Archer numbers are starting to increase again.

[3] Based on 1985 data; 1986 information was not available.

[4] Perceived estimate of success is 2 - 7%; archers are not specifically surveyed. Current archery harvest is considered to be negligible and extremely variable.

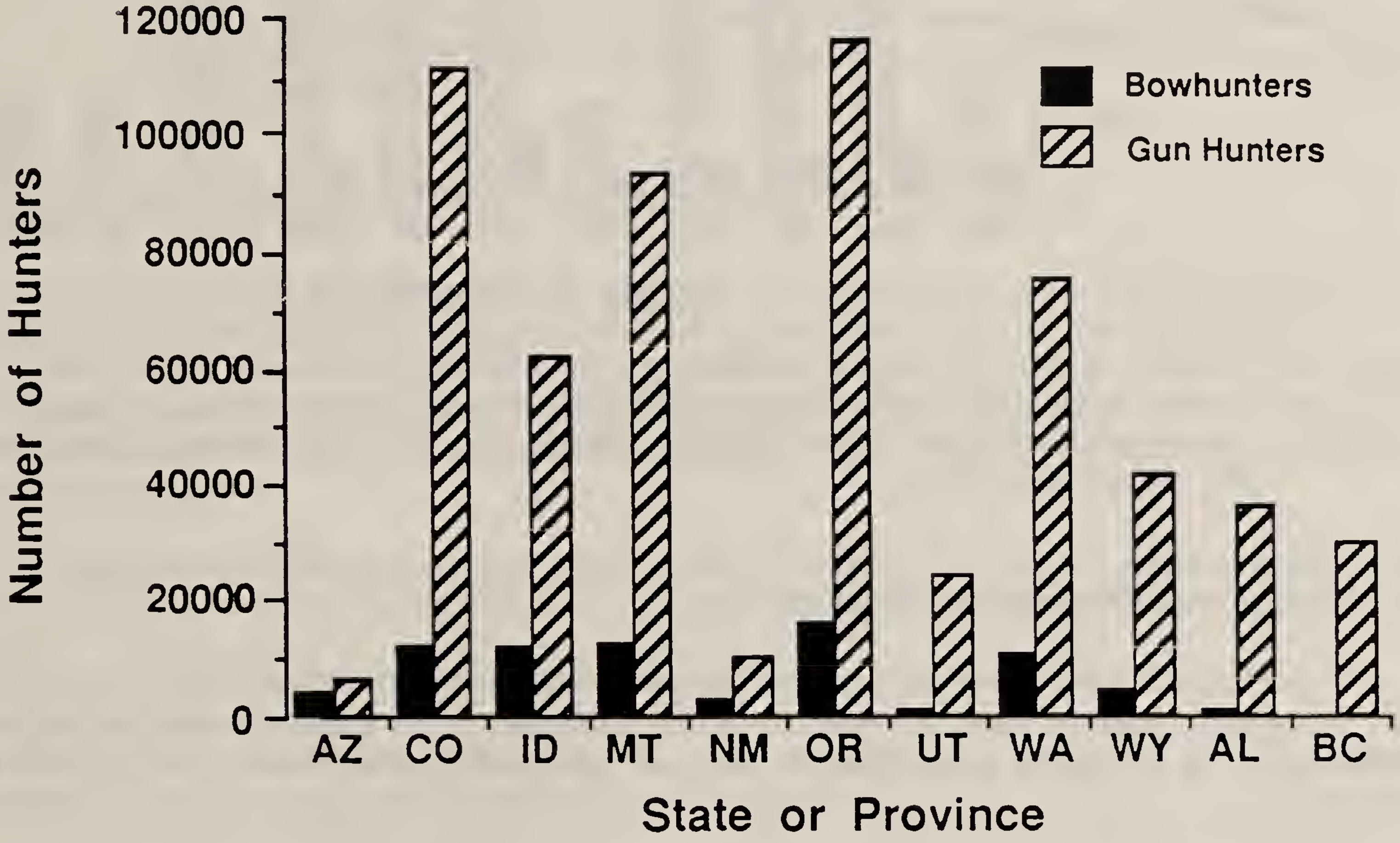

Figure 29. Archery vs. rifle hunter participation comparisons for 9 western states and 2 Canadian Provinces in 1986. (AZ=Arizona, CO=Colorado, ID=Idaho, MT=Montana, NM=New Mexico, OR=Oregon, UT=Utah, WA=Washington, WY=Wyoming, AL=Alberta, BC=British Columbia)

D. Archery Harvest Rates and Trends

Numbers of elk harvested in each state or province by bow hunters in 1986 also varied greatly (Table 5). The total estimated harvest by archers was 6,967 elk versus 95,900 elk taken by rifle hunters (Fig. 30). Bow hunter success is usually low (5-16%) and is lower in every area than rifle season rates (9-48%). Archery harvests typically comprise 1-9% of total annual elk harvests.

Five agencies indicated an increasing trend in archery elk harvest since 1982, while six reported relatively stable archery harvests, and none indicated a significant decline.

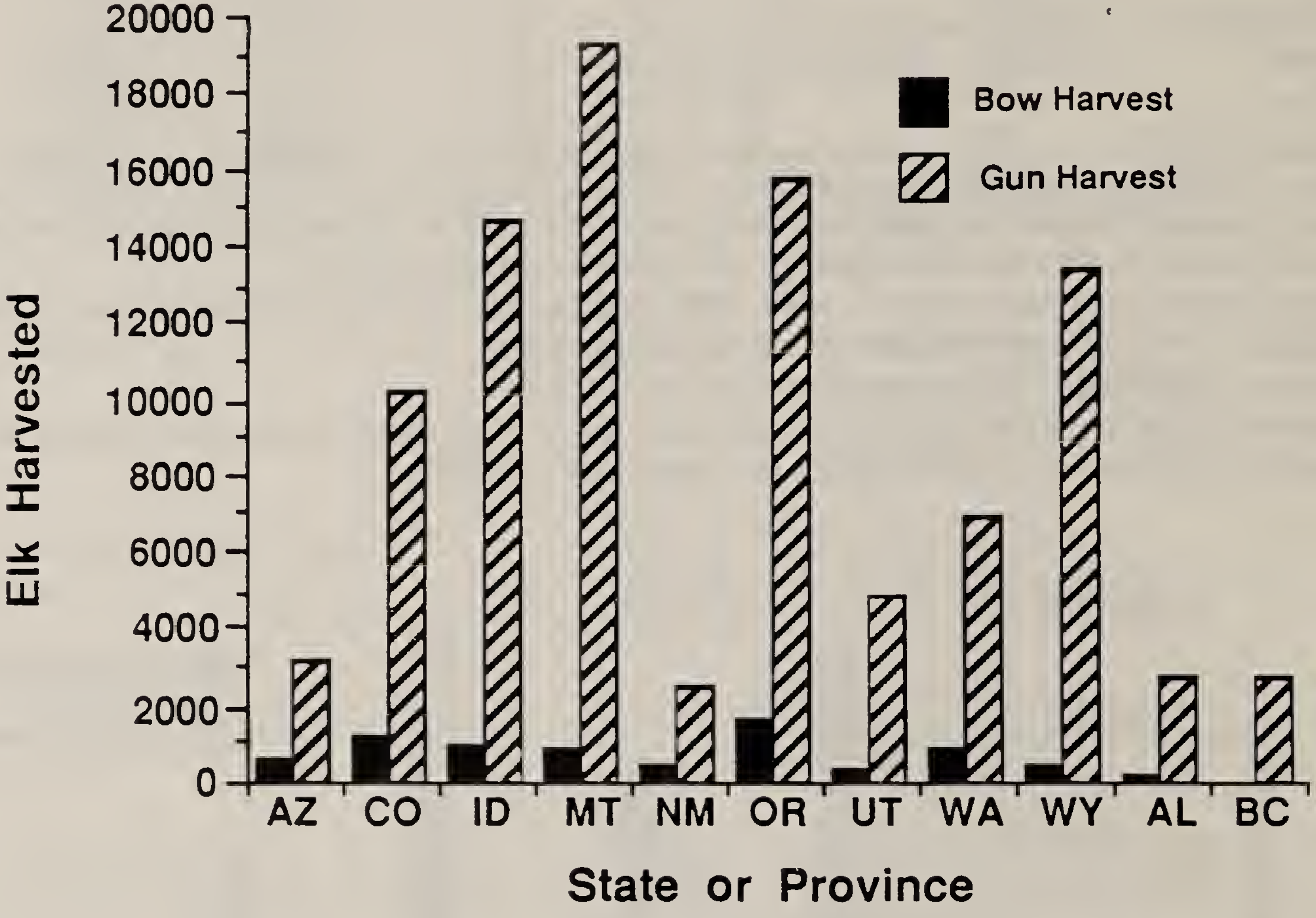

Figure 30. Archery vs. rifle elk harvest comparisons for 9 Western states and 2 Canadian Provinces in 1986. (AZ=Arizona, CO=Colorado, ID=Idaho, MT=Montana, NM=New Mexico, OR=Oregon, UT=Utah, WA=Washington, WY=Wyoming, AL=Alberta, BC=British Columbia)

E. Management Concerns and Problems

Several resource agencies identified real or potential concerns regarding archery hunting for elk. Most were based on social issues or public perception rather than demonstrated biological problems. The following is a summary of common concerns and issues regarding elk archery seasons.

1) In states where all elk hunting is by permit only, there is constant disagreement as to how many permits should be allocated to archers versus rifle hunters. The issue creates friction between hunter groups and places the resource agency in the middle of the conflict.

2) Competition for hunting opportunities exists between archers and rifle hunters. Gun hunters are particularly envious about longer early bow seasons and the archers' opportunities to hunt during the rut, which they believe disperses elk, decreases the rifle hunters' chance of success, and may adversely affect elk reproduction. Considerable argument occurs concerning timing and length of the early seasons.

3) Increasing demands are heard from other special user groups (i.e. muzzle loaders and crossbow hunters) to receive legal consideration and seasons similar to archers.

4) That a large number of elk are hit by bow hunters but not retrieved, resulting in high wounding mortality and waste of game.

5) Landowners are resistant to early archery seasons when their livestock are still on public grazing lands.

6) There is a belief that archers are taking more than their share of mature bulls owing to advantages of hunting during the rut.

7) Concern is expressed about rapid growth in archery hunting and a possible decrease in the quality of archery hunting opportunities. The option of restricting people to one type of weapon is discussed.

8) Enforcement problems exist concerning shooting animals with a gun during the archery season and trying to pass them off as bow-killed elk.

9) Success in limited quota archery hunts, particularly in late season, has exceeded the success rates for rifle hunters in the same area. In some areas, agencies can no longer justify special seasons based on increased opportunity versus lack of impact on elk populations.

F. Special Archery Studies

As of 1987, only Idaho, Washington, Oregon, and Montana have initiated special efforts to gather additional information on the biological or social aspects of archery hunting for elk.

Idaho is attempting to evaluate wounding loss of bulls using a large sample of animals radio-collared in the course of elk sightability research. As of 1987, they did not have adequate data to make a statement.

Washington is collecting elk reproductive tracts from several hunting units to evaluate the possible impact of hunting during the rut on reproductive performance. So far, no results are available.

Oregon is also looking at the possible affects of hunting during the rut on pregnancy rates and/or conception rates. First year data suggests that, in some units, there may be a disturbance factor related to early hunting while other units show no effects.

Results of the Montana survey of archers are summarized previously in this report.

G. Choice of Weapon Regulation

Four states have adopted "choose your weapon" regulations which restrict elk hunters to using either a firearm or a bow during a particular license year, but not both. Three have unlimited licenses available; assuring a sportsman of one option or the other; while all elk licenses are by permit in Arizona with 36% of available tags going to archers.

Arizona stabilized the number of archery permits with a quota beginning in 1984. Prior to that, bow hunter participation grew steadily from 750 licenses in 1972 to 3,935 in 1983. Growing concern over wounding loss, impact of hunting during the rut, and competition between user groups led to the archery quota. Until more data are available, Arizona will likely continue the current system. Now the biggest issue is what proportion of all elk permits should go to bow hunters.

Colorado adopted the "either/or" regulation in 1974 to encourage only the more proficient archers to participate. The regulation was suggested and strongly supported by the Colorado Bowhunters Association. Although the effects of this regulation were not measurable, the Bowhunters Association believed that it helped. The number of archers in Colorado has steadily increased under the "either/or" regulation, from 4,189 in 1974 to 11,671 in 1986 with a peak of 12,696 in 1983.

Oregon separated the firearm and archery seasons in an attempt to reduce firearm season pressure. Initially, the separation caused 20,000 people to commit to bow hunting. Bow hunter numbers have now stabilized at 14,000-15,000. Initially, there was a slight decrease in rifle hunters after this regulation was implemented, but the number of rifle hunters has increased to previous levels (approximately 116,000).

In 1984, Washington adopted an "either/or" weapon regulation. Initially, archery tag sales dropped, but have shown a steady increase each year since. It appears that the effect of weapon choice rules varies somewhat between states.

Reasons most commonly used to justify "either/or" weapon rules include:

1) Reduce the number of rifle and/or bow hunters exerting pressure on elk populations.
2) Improve the quality of bow hunting by removing the casual participant.
3) Improve the quality of rifle hunting by removing some of the participation.
4) Reduce competition and animosity between gun hunters and bow hunters.

Potential negative impacts of "either/or" seasons include:

1) Reduction in the number of recreational use days.
2) Loss of personal freedom in choosing activities during the hunting season.
3) Reduction in license sales.
4) Economic impact of lower equipment sales and purchase of services/goods, particularly in small, rural towns.
5) Loss of active interest and constituent support for wildlife management.

H. Survey Acknowledgements

The following individuals generously shared information and opinions on elk archery seasons and issues from their respective states or provinces: Richard A. Ockenfels (Arizona), Len Carpenter (Colorado), Lloyd E. Oldenburg (Idaho), Wally Haussamen (New Mexico), Allan R. Polenz (Oregon), Grant K. Jense (Utah), Rolf Johnson (Washington), Dale Strickland (Wyoming), John Gunson (Alberta), and Anna J. Wolterson-Strauss (British Columbia).

APPENDIX I.

1987 ARCHERY ELK HUNTING SURVEY
(Montana Dept. of Fish, Wildlife and Parks)

(1). A brief description of your archery elk season and an estimate of how many people hunt elk with a bow. Has this number been stable, decreased or increased over the past 5 years?

(2). What degree of harvest success do archers have for elk in your state or province? Do you have figures on the bull and cow elk archery harvest and how were these numbers obtained? What is your total elk harvest (gun and bow seasons) and what is the past 5 year trend in archery harvest?

(3). Has your agency conducted field studies or information surveys on bowhunting, to include biological or social questions? Please summarize briefly or include copies of those reports, thank you.

(4). Have you experienced any major management problems or concerns relating to bowhunting for elk? Please describe in detail.

(5). Have you implemented any special measures to deal with archery issues? What effect have had on the problem?

(6). Additional comments on the impacts of archery hunting on elk.